

Research / health safety Environmental management in Petroleum Industries.

1. Enumerate the industrial hazards and safety precautions under electrical and fire hazard.

Selection of electrical equipment in hazardous areas:

Selection criteria:-

→ gas grouping (based on ignition energy)

→ * Gas group - I Methane

* Gas group II A - Ammonia, CO, Propane, Butane, Benzene, Acetone, Methanol

* Gas group II B - Butadiene, Ethylene, Ethylene oxide, diethyl ether.

* Gas group IIC - hydrogen.

→ Temperature Classification

→ classified zones.

Electrical Hazards:

→ Shock: Electric shock occurs when the human body becomes part of the path through which current flows.

→ The direct result can be electrocutions

→ The indirect result can be injury resulting from a fall or movement into machinery.

→ Burns: Burns can result when a person touches electrical wiring or equipment that is energized.

Explosions:-

→ Explosions occur when electricity provides a source of ignition for an explosive mixture in the atmosphere.

ARC-Blaze:

→ The three primary hazards associated with an arc-blaze are.

→ Thermal radiation

→ Pressure wave

→ Projectiles.

Fires:-

→ Electricity is one of the most common causes of fires in the home and in the workplace. Defective or misused electrical equipment is a major cause.

→ Most problem with "Fixed wiring" problems with cords, plugs, receptacles and switches also cause electrical fires.

Effects on the human body:

Depends on :-

* Current and voltage

* Resistance

* Path through body

* Duration of shock.

Effects of AC Electricity:-

→ More than 3 mA - painful shock - Cause indirect accident.

→ More than 10 mA - Muscle contraction - "No let go" danger.

→ More than 30 mA - Lung paralysis, usually temporary.

→ More than 50 mA - ventricular fibrillation, usually Fatal.

→ 100 mA to 4 A - certain ventricular fibrillation, fatal

→ Over 4 A - heart paralysis, severe burns.

Protective methods and devices:-

→ The minimum headroom of working spaces about service equipment, switchboards, panel boards or motor control centers shall be 6 feet 3 inches.

→ Illumination provided for all working spaces about service equipment, switchboards, panel boards, and motor control centers installed indoors.

→ Inspect portable tools and extension cords.

→ Use power tools and equipment as designed.

→ Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged in tool.

→ Use gloves and appropriate footwear.

→ Store in dry a place when not using

→ Keep working areas well lit.

→ Ensure that cords do not cause a tripping hazard.

→ Remove damaged tools from use.

→ Use double-insulated tools.

→ Power source identification.

2. Describe the control methods to eliminate or reduce the risks arising from the use of working equipment.

Selection and suitability:

→ The cause of many accidents is attempting to use work equipment for a purpose for which it has not been designed.

→ For example:- it is possible to cut a rebate using a circular saw, but this is a highly dangerous operation and the correct equipment for this would be a vertical spindle moulding machine.

Maintenance :-

→ The requirement here is that work equipment is kept in a condition whereby failures which could result in a hazardous situation are avoided.

Information, instructions and training :-

→ written instructions provided by the manufacturer or supplier by way of manuals and instruction sheet etc.,

→ may need supplementation to cover the actual conditions of use.

Content of operating instructions :-

→ Residual hazards of the equipment e.g: excessive noise

→ Movement of the equipment, the nature of any fumes or other hazardous waste by products likely to be produced and the precautions to deal with these.

- with any relevant training requirements ; operating instructions to cover.
- normal operation.

Additional safeguarding:

- The employer should ensure that work equipment is installed located and used in a way ensuring that the risks to the operators and other workers have been reduced.
- in particular sufficient space b/w moving parts of work equipment and fixed or moving parts should be allowed.

Use of personal protective equipment:

→ Technical safety measures comprise PPE. These are devices or equipment designed to be carried or held by a worker to protect him/her against single or multiple risks that may affect his/her health or safety at work.

Work organization and procedures:-

→ proper work organisation is of crucial importance in ensuring safe operation of the work equipment.

Training:

→ The machinery user should ensure that workers given the task of using work equipment receive adequate training, including training on any risks that it may entail.

Inspection of work equipment:-

→ initial inspection and an inspection after assembly at a new site or in a new location.

→ periodic inspection and, where appropriate, testing within the means of national laws and / or practices.

→ special inspections each time exceptional circumstances that are liable to jeopardise the safety of the work equipment have occurred, such as work modification, accidents, natural phenomena or prolonged periods of inactivity.

③ What are guidelines followed for HVAC safety by OSHA:-

Definition:

→ As OSHA is concerned for the safety of workers on job sites this article will discuss OSHA rules on most job sites especially commercial and industrial construction sites.

OSHA safety rules and HVAC:-

→ As a part of their contract with the owner, they agree to set forth a safety program that complies with basic OSHA safety rules and regulations.

→ If it is a military site then the general contractor has agreed to abide by the military's equivalent of OSHA regulations which is EM-385.

→ The two safety guidelines are nearly the same with minor variations. Many workers on the job

Lockout/Tag out:-

→ can be applied to HVAC technicians

Bloodborne pathogens:

→ Can be applied to any worker on any job site.

Recordkeeping Rule seminar:

→ Can be applied to HVAC management.

4. Explain procedure and precautions to be taken when handling hazardous materials in workplace:-

Hazardous substance:

→ is a substance that contains ingredients that may be harmful to health in the medium or long term.

Material safety Data sheets (MSDS's):-

→ MSDS required for all chemicals that are deemed hazardous by the NIOSH. MSDS must be obtained for all chemicals in use or stored.

Hazardous substance register:-

→ Hazardous substances used at all workplaces must be identified listed on a register. Non hazardous chemicals should be included on manifests.

→ A collection of MSDS shall be readily available to workers and constitutes part of the register.

Manifest and site plan of the premises:-

→ The main purpose of manifest is to provide the emergency services authority with information about

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→ Site are usually workers of a sub-contractor who is directly contracted to the general contractor and the sub-contractor. The contracts b/w the general contractor and the sub-contractor also typically have provisions that the sub-contractor will abide by all safety regulations on the site as mandated by OSHA or EM-385

OSHA Safety rules and HVAC - Basics:-

→ Hazardous materials:- applicable to HVAC techniques as hazardous materials include compressed gases and other chemicals and gases HVAC technicians usually use to complete their work.

→ Machinery and Machine Guarding standards can be applied to HVAC.

→ Respiratory protection - can be applied to HVAC technicians.

→ Ergonomics Confined Space entry - can be applied to HVAC technicians.

Excavation:-

→ Trenching and Soil Mechanics - can be applied to HVAC technicians.

Electrical Standards:

→ can be applied to HVAC Technicians.

Fall Arrest Systems:

→ can be applied to HVAC Technicians.

the quantity, type and location of dangerous - ⑤
goods stored and handled on premises to enable them
to respond appropriately if called to an emergency.

Labelling:-

→ All containers containing any substance must be labelled appropriately. MSDS's will provide the information required for labelling.

Placarding:

→ placarding involves the use of hazardous substance diamonds indicating class and hazchem placards for entrances.

→ Legislative requirements for placarding of premises are dependent on volumes and packaging groups of hazardous substances.

* placarding on any entrance roads to the premises

* placarding at the entrance to the buildings.

Storage:

→ All hazardous substances are kept in secured storage facilities. The doors are kept locked except when there is an employee present who has been assigned the responsibility of accessing this.

General requirements for the storage of all Dangerous Goods

- * well ventilated and well lit
- * separated from ignition sources
- * secured from the public
- * protected from temperature fluctuations and direct sunlight.

Segregation of chemicals:

- The risks involved in the interaction of incompatible substances can include,
- * uncontrolled release of heat
 - * emission of noxious fumes
 - * Explosion.

Shelf storage:-

- Shelving must be compatible with the goods stored.
- the shelves should be constructed of chemically resistant materials.
- incompatible chemicals should not be stored together on shelves.

Disposal :-

- MSDS's should be viewed to determine the most appropriate means of disposal.
- In the event of a spill/leakage of the following procedures should occur.
- * ensure there is no danger to anyone in the area
 - * Attempt to contain the spill using appropriate PPE.
 - * Absorb any liquids with sand/kitty litter etc.,
 - * Inform the Senior Manager of the spill.
 - * Dispose of waste as per disposal instructions on MSDS.

5. what is fire safety? discuss elaborately :-

Fire :-

→ is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light and various reaction products.

→ Each of fuel, oxygen and heat elements must be present at the same time to have a fire.

→ A fire will burn until one or more of the elements are removed.

Class A :- it consists of ordinary combustible such as wood, paper, fabric, plastic and most kinds of trash.

Class B :- Flammable liquid gases flammable liquid such as gasoline (diesel, petrol etc.,) Flammable gases such as natural gas (butane, propane, methane; LPG)

Class C :- Electrical this sort of fire may be caused by short-circuiting machinery or overloaded electrical cables.

Class D :- Metal - alkali & alkaline earth metal (Li, Na, K, Be, Mg, Ca, Sr, Ti, Zr etc)

Class K or Class F :- (Kitchen Fires) cooking oils and fats.

Fire Safety :-

→ is the set of practices intended to reduce the

- destruction caused by fire. Fire safety measures include those that are intended to prevent ignition of an uncontrolled fire, and those that are used to limit the development and effects of a fire after it starts.

Common fire hazards:

- Electrical systems that are overloaded, poorly maintained or defective.
- Combustible storage areas with insufficient protection.
- Combustible near equipment that generates heat, flame, or sparks.
- Smoking.
- Equipment that generates heat and utilizes combustible materials.
- Electronic and electrical equipment.

Fire Safety plan structure:-

- Key contact information
 - Utility services
 - Access issues
 - Dangerous stored materials
 - Location of people with special needs
 - Connections to sprinkler system.
 - Proper stowage of flammable and hazardous materials.
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6. Explain in details about First aid:-

definition:

→ First aid is the assistance given to any person suffering a sudden illness or injury, with care provided to preserve life, prevent the condition from worsening, and/or promote recovery.

→ The employer shall ensure the ready availability of medical personnel for advice and consultation on matters of plant health.

→ In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person shall be adequately trained to render first aid.

→ Adequate first aid supplies shall be readily available.

First aid supplies :-

→ Assign a person to choose types and amounts of first aid supplies and for manufacturing same.

→ The supplies must be adequate.

→ Reflect the kinds of injuries that occur.

→ Must be stored readily available for emergency use.

→ Automated external defibrillator (AED) should be considered when selecting first-aid supplies and equipment.

7. What is HVAC and how it is used to plant construction or design?

HVAC:

→ The primary function of HVAC system is to provide (HVAC-Heating, ventilation and air-conditioning) systems.

→ is to provide healthy and comfortable interior conditions for occupants; well healthy and comfortable interior condition. for occupants.

→ Well designed, efficient systems do this with minimal non-renewable energy and air, and water pollutant emissions. energy and air, and water pollutant emissions.

Design consideration:

→ This may include heating, ventilating, cooling, humidifying, dehumidifying, filtering and air distribution to maintain acceptable indoor plant environment.

→ HVAC equipment must satisfy, hygienic, industrial fire and emergency requirements and must comply with established standards for construction, installation performance, energy conservation and safety.

Load calculations and weather conditions:

→ Heating and cooling loads should be calculated in accordance with the procedures. Design heat transmission coefficients used for cooling and heating loads should be obtained from the plant structure.

Branch and should reflect the actual materials to be specified.

→ The outdoor air design temperature for heating calculations should be obtained from the project design data or the ASHRAE (American Society of Heating Refrigerating and air-conditioning Engineers).

Plant design and construction:-

→ Small plants are generally designed to house most of the heat producing equipment such as motors, generators, switchgear and buses in one large open bay.

→ Larger plants usually contain a service bay area and several equipment rooms, shops, offices, control rooms, lunchrooms etc,

Special environmental conditions:-

→ Some plant-rooms such as control, computer and UPS rooms, lunch rooms, and office spaces require tighter environmental to avoid wide temperature fluctuations, to ensure proper operation of equipment and to provide comfort conditions for sedentary personnel.

Redundant systems or equipment:-

→ when inadvertent temperature shutdown of the main units cannot be tolerated, redundancy must be considered. Redundancy may be complete or partial.

