أرامكو السعودية
saudi aramco

safety handbook

minimum safety rules

Emergency Actions

All emergencies shall be reported immediately by any of the following methods:

1. Dial "110" from a Saudi Aramco phone, or the direct dial number of the respective area Regional Security Control Center (RSCC):
   - Abqaiq/Southern Area: 013-572-0110.
   - Dhahran/Central Area: 013-872-0110.
   - Jeddah/Yanbu/Western Region: 012-427-0110.
   - Ras Tanura/Northern Area: 013-673-0110.
   - Riyadh/Central Region: 011-285-0110.
2. Directly report the emergency condition to the nearest Saudi Aramco security gate/facility or RSCC.
3. Radio an operations group that has a telephone and ask them to dial "110" if you cannot contact the RSCC directly.
4. Contact the project site security gate/facility via telephone, radio, or messenger.

When reporting an emergency by telephone, radio, or messenger, ensure the following information is provided:

- Report: "This is an emergency."
- Exact location.
- Nature of the emergency/incident.
- Number of injured/missing personnel.
- Type of service(s) required (i.e., fire, medical, security).
- Name and badge/ID number.
- Telephone number you are calling from, if available.

*Note: Stay on the telephone or radio until told to hang up. Repeat the message if asked to do so.

What to do during emergencies?

- Follow local plans or instructions.
- Remain calm.
- Stop work.
- Proceed safely to assembly area/point.
- Remain at the assembly area until the All Clear is given.

Name: _____

ID: _____

Minimum Safety Rules

This handbook contains the minimum safety rules applicable to employees, contractors, or anyone performing Saudi Aramco work activities. Compliance to these rules is a condition of employment for Saudi Aramco employees and a contractual obligation for contractor employees.

In the event no Saudi Aramco general instruction, engineering standard, policy, or procedure exists that addresses a particular hazard, then the Safety Handbook shall govern. In case of conflicting requirements, the applicable Saudi Aramco general instruction(s) or engineering standard(s) shall take priority over this Safety Handbook. There are many applications to safety — many more than can be addressed in such a handbook. If you see an unsafe condition or behavior, do not disregard it because it is not listed in this handbook.

For additional information, consult related Saudi Aramco reference materials.

2nd Edition

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Saudi Aramco Safety Policy

Saudi Aramco will conduct its business in a manner that prevents incidents or accidents which cause loss of life, bodily injury or illness, or damage to property, assets or the environment. As reflected in Saudi Aramco's Corporate Values, we operate safely and are committed to the well-being of our workforce. Accordingly, the company will:

- Advise all employees and contractors of their safety responsibilities and regularly measure their performance.
- Evaluate, identify and eliminate or manage safety risks prior to beginning any operation or activity and continue to review such risks, complying with all applicable laws and regulations.
- Communicate safety objectives and expectations regularly to employees and all affected parties.
- Train employees and provide resources to maintain job competencies, including loss prevention responsibility and accountability.
- Design and construct company facilities utilizing recognized best technology and practices to safeguard property and people.
- Operate and maintain company facilities to assure safe operations.
- Ensure that contractors, suppliers and others adhere to the company's safety policies and procedures.
- Prepare for emergencies and other contingencies and respond promptly and effectively to incidents.
- Report and investigate all incidents, take prompt action to prevent recurrence and communicate lessons learned.
- Promote off-the-job safety and community awareness.
- Review and improve the company's safety performance continuously.

Safety Responsibilities

Personnel, as referred to in this handbook, include employees of Saudi Aramco and contractors. Saudi Aramco managers, division heads, foremen, supervisors, employees, and contractors have the following safety responsibilities:

Manager/Supervisor Responsibilities

- Establish and communicate safety rules and standards to all employees and contractors.
- Provide appropriate resources, tools, and training for employees.
- Award contracts using safety, health, and environmental criteria.
- Conduct and document safety meetings.
- Conduct inspections and tours regularly to maintain facilities in a safe condition.
- Correct unsafe acts and conditions promptly.
- Maintain facility emergency plans and conduct regular emergency drills.
- Investigate injuries, spills, and other incidents and promptly provide corrective actions.
- Review organization and employee safety performance periodically and provide feedback.

Employee Responsibilities

- Comply with applicable rules, standards, and safe work practices.
- Communicate safety rules and standards to contractors and coworkers.
- Correct or report unsafe acts or conditions.
- Maintain knowledge of safety requirements, including emergency response actions.

- Participate in safety meetings.
- Operate, inspect, and maintain facilities in a safe condition.
- Report injuries, spills, unsafe conditions, near misses, and incidents immediately.
- Assist in incident investigations as necessary.

Contractor Responsibilities

- Ensure that contractor employees and their subcontractors are trained in Saudi Aramco safety rules and are competent in their craft or skill.
- Comply with all Saudi Aramco rules, policies, and procedures.
- Report injuries, spills, unsafe acts and conditions, near misses, and incidents immediately to the Saudi Aramco person in charge.
- Operate Saudi Aramco equipment only with proper authorization.
- Hold prejob meetings and other safety meetings during job execution.
- Assist in incident investigations as necessary.

Basic Safety Rules

Stop Unsafe Work

1. Immediately STOP any unsafe work that has the potential to injure personnel, damage equipment, or harm the environment.

Report Incidents

2. Immediately report all work related injuries/illnesses, no matter how minor, to your supervisor.
3. Immediately report all fires, spills, or releases, no matter how small, to your supervisor.
4. Immediately report any unsafe condition, unsafe act, near miss incident, or vehicle collision to your supervisor.

Follow Safe Practices

5. Comply at all times with all safe driving requirements, particularly speed limits, when operating a vehicle.
6. Ensure that all persons in vehicles wear seat belts at all times.
7. Use the handrail and take only one step at a time when going up or down stairways.
8. Erect barricades and flagging around hazardous work areas, such as holes in decking and floor surfaces, trenches, road crossings, and overhead hazardous work.
9. Use only proper tools and equipment maintained in a safe working condition. Do not use homemade, modified, or damaged tools.
10. Maintain good housekeeping in your work area at all times.
11. Smoke only in designated areas. Do not use matches or lighters in restricted areas.

12. Rest and eat only in designated areas.
13. Use proper manual lifting techniques, or obtain assistance or mechanical lifting aids when lifting heavy loads.
14. Ensure all safety guards, switches, and alarms are in place and functional on operating machinery and electrical switchgear.
15. Lock, tag, clear, and try equipment to ensure proper isolation before working on energized equipment that has the potential for injury to personnel.
16. Notify the appropriate supervisor and affected parties, tag the device, and document the action properly whenever a safety device is removed from service and/or defeated.
17. Chain-lock or car-seal open all block valves on in-service pressure relief systems.
18. Inspect all fire extinguishers and other emergency equipment and keep them clear of any obstructions.
19. Properly label and store all chemical or hazardous material containers. Where specified, store drums in secondary containment areas or on drum containment pallets.

Avoid Unsafe Activities

20. Do not climb or stand on equipment, piping, valves, or unstable surfaces (e.g., chairs or barrels) to perform work.
21. Use approved fall protection measures (e.g., personal fall arrest system or scaffolding) if the working height is greater than 1.8 m (6 ft) from the floor or platform level.
22. Do not run in work areas.
23. Do not wear finger rings, wristwatches, jewelry, loose clothing, unsecured long hair, or loose accessories

within an arm's reach of rotating equipment or electrical switchgear.

24. Do not apply compressed industrial gases to yourself or others.
25. Do not operate equipment having a "DANGER, DO NOT OPERATE" (hold) tag.
26. Do not start work in any area, or on any equipment, without consent of the Saudi Aramco person in charge.
27. Do not use electronic devices (e.g., mobile phones, smartwatches, and instruments) that are not listed as safe for use in classified locations without proper approval.
28. Do not engage in horseplay or fighting.

Protect Yourself

29. Wear Saudi Aramco approved hard hats, safety eyewear with side shields, and safety footwear in all restricted areas, project sites, and in areas where specifically designated.
30. Use approved additional hazard-specific personal protective equipment (PPE), including goggles, face-shield, respiratory protection equipment, and body/hand protection where specific hazards requiring their use have been identified.
31. Wear proper PPE prescribed by the chemical hazard bulletin (CHB) or safety data sheet (SDS) when handling chemicals or hazardous materials.
32. Use approved hearing protection in designated high noise areas.
33. Use proper hand protection (e.g., gloves) when performing tasks that may present a hand injury risk.
34. Wear approved bicycle helmets at all times while riding a bicycle, skateboard, scooter, or other similar device.

Operational Safety Processes

This section provides a brief overview of key operational processes essential to safe operations:

Safety Process 1: Hot Work Permit
Safety Process 2: Cold Work Permit
Safety Process 3: Confined Space Entry Permit
Safety Process 4: Equipment Opening/Line Break Permit
Safety Process 5: Isolation, Lockout, and Use of Hold Tags

These processes are an integral part of how Saudi Aramco manages the hazards within its wide range of activities. The processes outlined in this section do not simply provide permission to carry out hazardous activities, but are vital processes to determine the hazards associated with a particular activity and the precautions to take so the job can be carried out safely.

Safe execution of job site activities can only be achieved by those responsible for the preparation and supervision of the work. Often the operational safety processes described herein are related and used in conjunction with each other. The work permit processes apply to specific work activities performed in restricted areas and to restricted activities designated by proponent organization managers at all company facilities and project sites.

This section only provides basic information related to these safety processes; for full details refer to the applicable Saudi Aramco General Instructions (GIs), including GI 2.100, GI 2.709, and GI 6.012, the Saudi Aramco Work Permit System Reference Guide, as well as the Saudi Aramco *Construction Safety Manual*.

Safety Process 1: Hot Work Permit

When work permits are required, the purpose of the hot work permit process is to control work activities that may produce enough energy to ignite flammable atmospheres or combustible materials. A hot work permit (Saudi

Aramco Form 9873-2 RED) applies to work that develops sparks, flames, or heat sufficient to cause ignition.

Examples of hot work include:

- Open flames, welding, or torch cutting.
- Using spark producing tools or equipment.
- Abrasive blasting.
- Running internal combustion engines.
- Work on, or in close proximity to, live electrical apparatus.
- Energized electrical devices not rated for the electrical classification of the area.

Safety Process 2: Cold Work Permit

When work permits are required, the purpose of the cold work permit process is to control work activities that will not produce sufficient energy to ignite flammable atmospheres or combustible materials. A cold work permit (Saudi Aramco Form 9873-3 BLUE) applies to work that can still involve hazards that must be evaluated during the joint site inspection.

Examples of cold work include:

- Removing or disturbing asbestos-containing material (ACM).
- Erecting or dismantling a scaffold.
- Painting with a brush.
- Excavating by hand.
- Installing shoring.
- Use of hand tools that have no electrical power or that do not produce a spark.
- Repairing a packing gland on a pump.

Cold work can still involve hazards that may require conducting atmospheric gas tests. Workers may be required to use specific personal protective equipment (PPE), erect barricades and warning signs, and follow specific work procedures.

Safety Process 3: Confined Space Entry Permit

The purpose of the confined space entry (CSE) permit process is to ensure safe entry by personnel when any part of the body enters into a space that meets the criteria for a confined space. A CSE permit (Saudi Aramco Form 9873-4 GREEN) applies to work during entry into any space or structure that:

- Has limited or restricted means of entry or exit.
- Is not designed for human occupancy.
- Contains or has the potential to contain a hazardous atmosphere.
- Contains any other recognized serious safety or health hazard(s).

Examples of confined spaces include tanks, vessels, vessel skirts, vaults, manholes, sewers, valve boxes, lift stations, and structures or excavations 1.2 m (4 ft) deep or deeper. Areas above floating roof tanks where the top of the roof is more than 1.2 m (4 ft) below the rim of the tank are also considered confined spaces.

Safety Process 4: Equipment Opening/Line Break Permit

The purpose of the equipment opening/line break permit process is to ensure the safe initial opening of equipment, vessels, or piping that is part of a closed system and contains (or has the potential to contain) flammable, combustible, toxic, or injurious materials (e.g., high-pressure steam).

An equipment opening/line break permit (Saudi Aramco Form 9873-1 YELLOW) applies to activities including:

- Opening oil or gas lines or systems.
- Opening steam and condensate lines or systems.
- Opening lines or systems containing hydrogen sulfide (H_2S).
- Opening lines or systems containing nitrogen (N_2).
- Opening lines or systems containing a hazardous material (e.g., caustic or sulfuric acid).

Prior to opening equipment or breaking open a line, all energy sources must be controlled and all associated systems isolated in accordance with GI 6.012. See Operational Safety Process 5.

Safety Process 5: Isolation, Lockout, and Use of Hold Tags

The purpose of the isolation, lockout, and use of hold tag process is to prevent injury or loss from the uncontrolled release of stored energy.

Electrical isolation, lockout, and use of hold tag procedures shall be used before and during any activity requiring personnel to work on or near de-energized circuit parts or where there is danger of injury due to an unexpected startup of equipment (e.g., a motor-driven pump).

Other energy sources such as pressurized gas, process fluids, and hydraulic, pneumatic, thermal, chemical, and mechanical systems shall be isolated by valves, blinding, double block and bleed, or disconnecting.

Follow the local isolation, lockout, and hold tag procedures and requirements in GI 6.012 for the proper isolation procedures for energized equipment and systems.

Electrical Energy Isolation Methods

1. Accomplish electrical isolation using a device that physically prevents the transmission or release of

energy like a manually operated circuit breaker or a disconnect switch.

2. Control circuit type devices such as push buttons and selector switches are not energy isolating devices.
3. Isolation may be accomplished by removal of fuses, disconnection of electrical cables, or physical removal of a component of the system supplying energy to the equipment.
4. Isolation is completed only when no associated control device has the capability of energizing the equipment.
5. Identify physical isolation points accordingly with a hold tag.

Lock, Tag, Clear, and Try

1. Identify isolation locations and types of isolation devices required prior to beginning work.
2. Shut down/de-energize equipment and remove any residual energy (e.g., contents of process piping) by draining, venting, or purging after isolation. The proponent organization shall always be the first to install an approved **Lock(s)** on all isolation points, and the last to remove them.
3. **Tag** the lock(s) with a "DANGER, DO NOT OPERATE" tag.
4. **Clear** the equipment/area of all affected personnel and tools prior to trying to start the equipment.
5. Before starting work, **Try** to start or energize the equipment locally to verify proper isolation and de-energization.
6. Install lock(s) at each corresponding isolation point (maintenance/contractor personnel). If performing maintenance or servicing of equipment, verify that isolation and de-energization of the equipment has been accomplished.

7. Only the person(s) originally attaching the lock and tag is authorized to remove the lock and tag. When a shift change occurs, the oncoming supervisor must review isolation locations and placement of locks and tags. Proponent's locks and tags may be left installed and keys to locks may be transferred.
8. Remove lock(s) and tag(s) when the work is completed or you leave the job permanently (craftsman).
9. Remove lock(s) and tag(s) when the equipment is safe to energize (proponent organization employee).
10. When work is complete and all lockout devices removed, affected personnel shall be notified and the equipment placed back in service.

Process, Hydraulic, and Pneumatic Energy Isolation Methods

There are four primary methods for isolating process lines and equipment to prevent the release of energy or materials. The isolation methods are arranged below in general order of protection provided from lowest to highest, but the specific isolation method is determined by the tasks to be performed and the associated material/ stored energy.

Single block valve

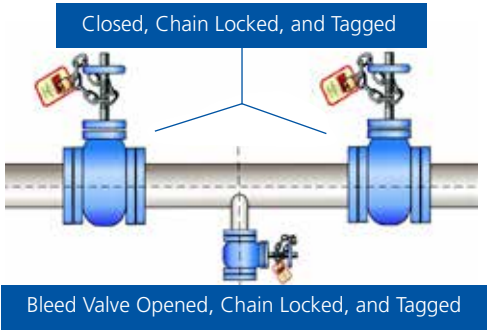
Use of a single block valve is the minimum isolation procedure for certain routine maintenance operations where no open flame work or toxic material is involved. This isolation method shall not be used when piping or equipment containing hazardous materials is to be opened for confined space entry or hot work activities.

Double block and bleed

Double block and bleed (DB&B) is a method of isolating process piping where two block valves in series are closed, locked (chained), and tagged with a bleed or vent valve in the line between the two closed valves that is locked and

tagged open (see Figure A). Refer to GI 6.012 for details on applying DB&B as an isolation method. This isolation method shall not be used when piping or equipment containing hazardous materials is to be opened for confined space entry or hot work activities.

Figure A. Example of Double Block and Bleed Isolation



Blinding

Blinding is the installation of a solid metal plate between two pipe flanges or at the end of a disconnected pipe to prevent any materials from being released. It involves inserting a slip blind or blind flange at a flanged joint or swinging (rolling) a spectacle blind if provided by design. The blind point(s) must have a completed hold tag.

Disconnection of piping

Disconnection of piping is the physical disconnection of the piping where allowed by flanges. Steps must be taken to ensure no hazardous materials can leak or be discharged from the open ends of piping (e.g., blinding). The disconnection point(s) must have a completed hold tag.

Safety Topics

This section contains rules and precautions for specific safety topics and hazards. Some of the topics listed herein may not relate to your specific job and the associated safety hazards. The minimum safety rules are provided to assist Saudi Aramco personnel and contractors perform their day-to-day work activities safely.

These 23 safety topics are arranged in alphabetical order for your use.

Abrasive Blasting and Coating

Apply the following precautions during abrasive blasting and coating operations:

Abrasive Blasting Operations

1. In restricted areas, abrasive blasting is considered hot work (see Safety Process 1: *Hot Work Permit*).
2. Only qualified and Saudi Aramco certified individuals shall operate abrasive blasting and coating equipment.
3. Wear a high-efficiency dust filter respirator approved by NIOSH/MSHA when handling abrasive blasting media (i.e., grit).
4. Wear Saudi Aramco approved hearing protection in areas near abrasive blasting operations where noise levels exceed 85 decibels (dBA).
5. Wear an air-supplied hood (type "CE" supplied-air respirator) approved by NIOSH/MSHA and additional personal protective equipment (PPE), including coveralls, and leather or neoprene gloves and apron when performing abrasive blasting operations.
6. Use only approved abrasive blasting materials. Do not use silica sand or combustible abrasives capable of forming explosive mixtures with air as abrasive blasting materials.
7. Perform mechanical integrity testing (i.e., wall thickness measurement) on any in-service, pressure containing equipment that will undergo abrasive blasting.
8. Do not perform abrasive blasting on tanks/vessels that are receiving or discharging product.
9. Never point an abrasive blasting nozzle at any person or part of your body.
10. Place barricades and warning signs around work areas where abrasive blasting is taking place.

Abrasive Blasting Equipment

1. Inspect, test, use, and maintain air compressors supplying breathing air per Saudi Aramco and the manufacturer's requirements.
2. Include a NIOSH/MSHA (or equivalent organization) approved particulate filter and water/oil traps in the breathing air delivery system of abrasive blasting equipment.
3. Oil lubricating air compressors that supply breathing air require continuous carbon monoxide (CO) monitoring with an audible alarm.
4. Replace breathing air filters as recommended by the manufacturer, but not less than every three months. Check and drain water/oil traps daily.
5. Use Compressed Gas Association (CGA) Grade 'D' supplied air for hoods or respirators and ensure the delivery system meets the manufacturer's specifications.
6. Test air compressors supplying breathing air quarterly using an independent Saudi Aramco approved third party testing facility to ensure that the air quality supplied by the compressor meets CGA Grade 'D' air quality requirements.
7. Electrically bond the nozzle, hose, blasting equipment (e.g., blast pot), and the material/equipment being cleaned to dissipate static electric charge buildup.
8. Electrically ground the blast pot and material/ equipment being cleaned to prevent the buildup of static electricity.
9. Install a safety pin/wire and whip checks to prevent disengagement of all twist lock fittings.
10. Use a constant pressure handle (deadman switch) that will automatically shut off when pressure is released.

Aviation Safety

The following precautions are for Saudi Aramco aviation passengers. Most importantly, follow commands from trained aviation employees at all times, both on the ramp and inside the aircraft.

General Requirements

1. Smoking is prohibited in the terminal building, onboard all Saudi Aramco aircraft, and on aviation ramps, apron areas, helipads, and helidecks.
2. Follow directions from the ramp dispatcher, pilot in command (PIC), or helideck landing officer (HLO) while transferring to and from the aircraft.
3. Follow the marked walking zones and never approach an aircraft or helicopter for boarding unless directed to do so. Keep clear of propellers and engine intakes at all times when approaching the aircraft.
4. Follow instructions posted in the ramp area and pathways.
5. Do not use mobile phones onboard the aircraft nor on aviation ramps, apron areas, helidecks, or helipads.
6. Do not wear personal headphones on the aviation ramp.
7. Only persons actively engaged in aircraft servicing are permitted to walk around aircraft.
8. Inform aviation personnel if you observe foreign object debris on the ramp, helideck, or helipad.

Baggage

1. Declare all items in checked or carry-on baggage that might be considered dangerous goods prior to boarding.
2. Comply with IATA *Dangerous Goods Regulations* when transporting dangerous goods on Saudi Aramco aircraft.

3. Observe baggage requirements and limitations (i.e., number of bags, weight, and size) for the aircraft.
4. Store carry-on baggage only in approved compartments.

Safety Procedures for Takeoff and Landing

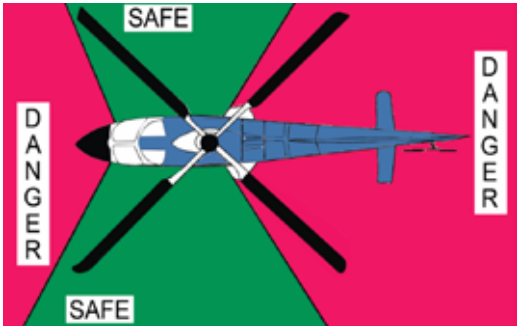
1. Comply with all flight crew and/or PIC instructions.
2. PIC has overall responsibility for the safety of the aircraft, passengers, and cargo.
3. Fasten seat belts at all times while seated, or as directed by the cabin crew.
4. Remain seated in the upright position during takeoff and landing.
5. Remain seated until the aircraft comes to a complete stop, and at all times when the "Fasten Seat Belt" sign is illuminated. Do not unfasten seat belts until directed by crew members.
6. Do not obstruct aisles, galleys, or lavatories.

Helicopters

1. The captain in the left seat has overall responsibility for the helicopter and its passengers. Follow both the captain's and co-pilot's instructions at all times.
2. Carry a valid Saudi Aramco Helicopter Passenger Safety Certificate when traveling over **land**.
3. Carry a valid Helicopter Underwater Escape Training (HUET) Certificate when traveling offshore over **water**.
4. Keep clear of the helipad or helideck until the helicopter has landed.
5. Approach or depart the helicopter only after receiving a signal or command from the helicopter pilot, co-pilot, HLO, or the helicopter deck assistant (HDA). Passengers must be in full view of the pilots and HLO.

6. Approach or depart the helicopter from either side quadrant to avoid the main and tail rotors. **Never** approach from the front quadrant or walk under the tail rotor. See Figure B.
7. Do not wear loose clothing, including thobes, ghutras, caps, and sandals/slippers when traveling in helicopters as they may entangle or interfere with exiting the aircraft or hinder flotation during an emergency.
8. Remove hats and keep a firm grip on all hand-carried articles when walking to and from the helicopter. Carry long objects horizontally and below the waist.
9. Do not place objects in the passenger cabin; they must be stored in baggage compartments.
10. Wear approved hearing protection on all helicopter flights.
11. Never throw objects from a helicopter.
12. Wear seat belts at all times.
13. When traveling over water, wear Saudi Aramco Aviation approved personal flotation devices (PFDs).

Figure B. Helicopter Approach Zones



Compressed Gas Cylinders

Apply the following minimum precautions for the safe storage, handling, and use of compressed gas cylinders.

Storing Cylinders

1. Store cylinders in an upright, secured position; use bottle/cylinder racks wherever possible.
2. Place cylinder valve caps on all cylinders once the regulator is removed.
3. Keep stored oxidizers (e.g., oxygen, chlorine) separated from flammable gas cylinders by at least 6.1 m (20 ft) or by a 1.5 m (5 ft) high, noncombustible barrier (30 minute fire rated).
4. Store cylinders in dry, well-ventilated areas.
5. Keep cylinders away from direct flame, sunlight, electrical connections, and other ignition sources.
6. Do not allow cylinders to have direct contact with the ground or be exposed to extreme weather.
7. Do not store cylinders at temperatures exceeding 54 °C (130 °F). Outside storage areas will usually require protective shelters.
8. Properly identify and separate empty and full cylinders.

Handling and Transporting Cylinders

1. Properly secure cylinders in an upright position during movement and transport.
2. Never lift a cylinder by its valve.
3. Do not use slings, ropes, or electromagnetic devices to lift cylinders. Use specially designed cylinder carriers with lifting eyes.
4. Ensure all cylinders are labeled with their contents.

5. Do not strike cylinders together, drag, drop, or use as a support.
6. Fully close valves and place cylinder cap on valve when moving cylinders.
7. Use cylinder trolleys, material baskets, cylinder racks, and other approved types of equipment to transport cylinders.
8. Treat cylinders marked EMPTY as a possible hazard. No cylinder is completely empty of gas.
9. Equip vehicles transporting cylinders with the required firefighting and first aid equipment.

Using Cylinders

1. Do not connect, disconnect, or use compressed gas cylinders unless you have been trained.
2. Inspect cylinders for damage, corrosion, valve leakage, and hydrotest date before use. Do not use damaged or defective cylinders.
3. Immediately remove leaking cylinders to an open space, clear of personnel and ignition sources.
4. Use fittings with threads that match the cylinder valve outlets. Never force a fitting onto a cylinder.
5. Use attachments with suitable pressure rating and material for the gas (e.g., no copper tubing).
6. Do not use oil or grease as a lubricant on valves or attachments.
7. Use approved pressure-reducing regulators with a check valve connected to the cylinder valve.
8. Position pressure relief valves (if required) to face away from structures and combustible materials.
9. Do not open valves on cylinders more than 1-1/2 turns. Open and close valves by hand.

10. Always close the cylinder valve before attempting to stop leaks.
11. Do not place cylinders in confined spaces or next to excavations. Ensure the area has adequate ventilation.
12. Never use compressed gases for cleaning persons, clothing, or other surfaces.
13. Protect cylinders from direct flame, sunlight, and other heat sources.
14. See the *Cutting, Welding, and Brazing* safety topic for requirements when using compressed gas cylinders for oxygen-fuel welding and cutting.

Crane Operations and Rigging Equipment

This safety topic applies to all types of cranes including mobile and fixed cranes (e.g., overhead and gantry cranes) and the use of slings and other rigging hardware.

Crane/Lifting Equipment Inspections

1. Inspect all Saudi Aramco, contractor, or third-party mobile and fixed cranes prior to use with the *Saudi Aramco Crane Operator Daily Inspection Checklist* found in GI 7.028.
2. Operate only cranes that have a valid inspection sticker from Saudi Aramco or a Saudi Aramco approved third party.
3. Verify that supplemental lifting equipment used below the hook (e.g., spreader bars, manbaskets) has a valid inspection sticker.

Crane Operations

1. Do not operate a crane unless you are:
    - Certified per the requirements of GI 7.025 for the mobile crane, fixed crane, or extensions/ attachments indicated on the certificate, or
    - Under the direct supervision of a qualified trainer.
    - Performing crane maintenance or inspection duties.
2. Communicate details of any crane lifts to the affected personnel in the area of operation.
3. Use universal hand or radio signals for communication between the designated signal man and crane operator.
4. Do not obstruct the crane operator's line of sight to the designated signal man.
5. Keep all cab glass clean without obstructions (e.g., curtains, cardboard) or damage. Cab glass must be safety glass.

6. Use tag lines to control all suspended loads, except when their use may create a greater hazard.
7. Do not side load (i.e., be sure to center the hook directly over the load).
8. Avoid suspending loads over personnel, equipment, or traffic areas.
9. Know the accurate weight of all loads and lifting gear prior to the lift.
10. Transport personnel only using approved crane-suspended personnel platforms (manbaskets).
11. Use fully extended outriggers with appropriate float pads and mats when performing crane lifts. Do not permanently secure mats to the outrigger pads.
12. Do not leave the crane cab unattended while a load is suspended, unless the load is properly secured to a load-bearing structural member.
13. Position (lower) hydraulic crane booms and secure the hook while traveling.
14. Do not perform crane lifts at wind speeds above 32 km/h (20 mph) unless otherwise specified by the manufacturer.
15. Do not perform crane-suspended personnel platform (manbasket) operations at wind speeds greater than 25 km/h (15 mph).
16. Maintain the following minimum distances when conducting crane operations near trenches and excavations:
    - Depth of the trench or excavation for Class A soils.
    - 2X the depth of the trench or excavation for Class B and C soils (see the *Excavation and Trenching* safety topic for soil classifications).

17. Maintain the minimum distances provided in Table 2 in the *Electrical Safety* safety topic when operating cranes around overhead power lines.
18. Use Critical Lift Plans (see GI 7.028) for certain conditions and activities, including:
    - Cranes operating around power lines.
    - Operating around hydrocarbons and aboveground pressurized piping areas, populated/traffic areas, and railroads.
    - All loads of 40 tons or greater.
    - All loads exceeding 85% of the rated load capacity of the crane for that specific lift.
    - Tandem, multiple, or tailing lifts (any lift requiring two or more cranes to lift one load).
    - Lifts involving a crane-suspended personnel platform (manbasket). *A Crane Suspended Personnel Platform (Manbasket) Permit* is required (see GI 7.027).
    - High level and/or long reach crane lifts.
    - Lifts on barges, vessels, or loading piers.
    - On rubber or pick and carry lifts.
    - Nighttime crane lifts, except as approved during a turnaround and inspection (T&I) or shutdown.
    - Blind lifts.
    - Other lifts as determined by Saudi Aramco management.

Rigging Practices and Inspection

1. Rig all crane loads using a certified rigger.
2. Use accepted rigging techniques when lifting loads.

3. Use only rigging equipment that is rated for the load being lifted.
4. Avoid sharp bends in slings; protect slings from sharp edges and abrasions.
5. Rig loads off load-bearing structural members only after prior approval. Do not rig from process piping.
6. Do not modify, repair, shorten, or lengthen slings. Verify that the manufacturer's safe working load (SWL) and serial number are clearly marked on each sling.
7. Do not use sling angles less than 30 degrees above the horizontal. The recommended safe working angle is 60 degrees above the horizontal.
8. Completely close/bolt shackles and other connecting devices.
9. Do not use fasteners or other rigging hardware manufactured in-house.
10. Ensure a rigger certified per the requirements of GI 7.025 inspects all slings, fittings, and shackles before each use.
11. Inspect slings and other rigging hardware per applicable standards every 6 months using a certified rigger.
12. Maintain a job-site log of slings that identifies the sling and periodic inspection results. Record defective slings in the log and remove them promptly from the job site.
13. Inspect and certify all "A-Frames" by a certified inspector prior to attaching any rigging equipment.

Cutting, Welding, and Brazing

Apply the following minimum safety and health precautions during gas welding, cutting, brazing, and electric arc welding operations.

General Safety Precautions

1. Use approved PPE during all welding, cutting, and brazing activities, including when providing help/assistance.
2. Wear leather gloves and body protection, safety boots, and leggings (as needed) to provide protection against heat, sparks, and flying metal particles. Do not wear pants tucked inside boots.
3. Wear a welding helmet during welding operations, and a helmet or welding goggles during cutting and brazing operations. Use shaded tempered glass or shatter-resistant protective lenses on all welding helmets and goggles.
4. Whenever possible move the object to be welded inside a maintenance shop or laydown yard.
5. Remove combustible material from around the work area or protect materials from sparks, slag, or heat with fireproof material or wetting.
6. Remove/protect combustible material below an elevated welding or cutting work area.
7. Visually inspect equipment daily. Immediately remove or repair/replace defective or damaged equipment.
8. Conduct welding and brazing operations in well-ventilated areas.
9. Turn off all equipment and close compressed gas cylinder valves when unattended.
10. Provide a portable fire extinguisher near the hot work area. Cover all sewers in hydrocarbon facilities within 23 m (75 ft) of the work area.

11. Maintain a trained fire watch during welding and cutting operations and for 30 minutes afterwards.
12. Do not perform welding, cutting, and brazing in oxygen enriched environments (i.e., an oxygen concentration greater than 23.5%).
13. Verify the surface, pipeline, or vessel/container to be cut, welded, or brazed has been drained, cleaned, and purged to remove all flammable or toxic materials (including residue). Determine the flammability of any coatings prior to beginning work. Identify the presence of hydrocarbons using gas testing equipment if necessary (see Safety Process 1: *Hot Work Permit*).
14. Use mechanical ventilation and/or local exhaust when welding, cutting, or heating alloys that release toxic material per Saudi Aramco requirements. Additional respiratory protection may be required.

Electric Arc Welding Operations

Also see the *Electrical Safety* safety topic.

1. Ground the frame of electrical arc welding machines per Saudi Aramco requirements.
2. Securely attach ground returns to the material being welded by cable lugs, clamps, or bolts. Connect returns as close as possible to the location being welded.
3. Do not connect ground returns to piping containing flammable gases or liquids, or conduits containing electrical circuits.
4. Ensure that welding cables are continuous within 3 m (10 ft) of the electrode holder. Repair damaged welding cables using a standard plug-and-socket coupling.
5. Inspect welding cables for cuts or abrasions to the insulation. Remove all damaged welding cables from service. Temporary repairs, splices, and taped joints are prohibited.

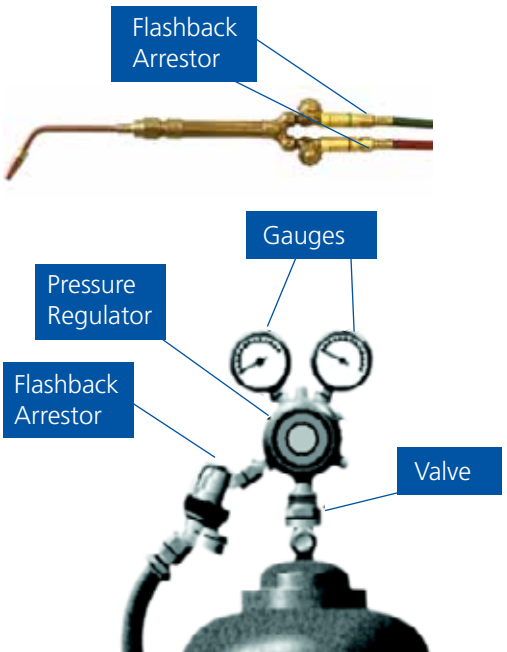
6. Use noncombustible or flameproof welding screens when working near other personnel or equipment.
7. Remove the electrode from the holder and unplug electrode holders when operations are discontinued.
8. Ensure electrical outlets on welding machines are 110 volts (V), three-prong type, with residual current devices (RCDs) (e.g., ground fault circuit interrupters [GFCIs], earth leak circuit breakers [ELCBs]).

Gas Welding, Cutting, and Brazing Operations

Also see the *Compressed Gas Cylinders* safety topic.

1. Keep cylinders, valves, and attachments free of dirt, grease, and oil.
2. Clear debris from an oxygen or fuel cylinder's valve by opening it slightly ("cracking") before connecting the hose.
3. Stand to one side of the valve/regulator outlet when cracking the cylinder valve. Do not perform this near hot work or other sources of ignition.
4. Use compression fittings on hose connections.
5. Check all equipment, attachments, and connections for damage and leaks (e.g., with soapy water) before use. Do not use defective equipment.
6. Turn off gas regulators and bleed hoses to zero pressure at the end of the shift or task.
7. Close the torch nozzle when not in use. Do not leave torches with open supply gas valves unattended.
8. Protect hoses from potential damage and keep cylinders upright (vertical position) during operations.
9. Install flashback arrestors on the *outlets* of all oxygen/fuel cylinder regulators and on the *inlet* of oxygen/fuel cutting torches (See Figure C).

Figure C. Flashback Arrestor Positions on Cutting Torches and O_2/Acetylene Cylinders



10. Use only friction lighters (strikers) to light a torch; never light a torch with matches or a cigarette lighter.
11. Ensure acetylene cylinders have a handle or valve wrench in place at all times.

Drilling and Well Servicing

General Safety

1. Post signs and/or flags at the entrance of all drilling and well servicing locations to indicate special hazards (e.g., H_2S).
2. Do not enter a Drilling & Workover (D&WO) site without a current H_2S certificate approved by the D&WO organization.
3. Report to the person in charge when arriving to the rig location for orientation.
4. Set and test anchors and guy lines according to industry recommended practices.
5. Flag/mark guy lines with high-visibility material.
6. Install an independent escape system on drilling derricks to allow the derrickman to safely descend to the rig floor or ground in the event of an emergency. Follow manufacturer specifications during installation of the system.
7. Ensure a full-opening safety valve, for all sizes of drill pipe, is readily available on the rig floor.
8. Place a fusible cap or other device on remotely operated surface safety valves during well servicing operations.
9. A pressure rating greater than the maximum treating pressure is required on all connections on the wellhead and tubing, otherwise use a tree saver.
10. Do not allow service vehicles and equipment to be located closer than 15 m (50 ft) from the wellhead or processing equipment. A hot work permit may be required for certain types of equipment in accordance with Safety Process 1: *Hot Work Permit*.
11. Do not ride the elevators and cathead lines.

12. Restrict nonessential personnel from the rig floor during perforating wireline and coil tubing operations.
13. Review and approve simultaneous operations for drilling and production locations/platforms on a case-by-case basis.
14. Use caution to ensure the S hooks remain engaged when removing pipe with S hooks. Pick up no more than four joints at any one time.
15. Roll all tubulars from the ends. Do NOT roll tubular goods with your feet.
16. Stand off to the side and out of the "line of fire" when releasing chain binders.

Casing Operations

1. Do not rig up casing equipment above the rig floor until all drill pipe has been pulled out of the hole and unnecessary equipment has been removed.
2. Barricade and do NOT use the stairs located next to the V-door during casing operations. Barricade the area under the V-door and near the catwalk while the pickup or laydown machine is in operation.

Tripping Operations

1. Do not put your fingers in the box end or pin end of a lift-sub, joint of drill pipe, drill collar, or casing to control movement of the tubulars.
2. Use a tag line when moving pipe, tubing, casing, etc., from the V-door onto the rig floor. Never wrap the tag line around your hand or forearm. When on the ground, stand clear of the catwalk and V-door.
3. Handle slips with your PALMS UP/THUMBS OUT to prevent hand injuries.
4. Set slips only after the drill pipe has come to a complete stop.

Electrical Safety

Apply the following minimum safety and health precautions when working on or near electrical equipment, including power lines. See the *Hand and Power Tools* safety topic for additional information on portable electric power tools.

Qualifications

1. Use personnel who are trained and certified for the electrical work to be performed when operating or maintaining electrical equipment, or are present within minimum clearances of such equipment.
2. Complete and pass electrical hazard recognition training prior to working on electrical equipment, including de-energizing electrical circuits.
3. Confirm that at least one member of each crew has obtained training and certification in first aid and basic life support prior to conducting electrical work.

Work Practices

1. De-energize all circuits before beginning work. Use Safety Process 5: *Isolation, Lockout, and Use of Hold Tags* to prevent the electrical circuits from being inadvertently energized.
2. Consider all electrical conductors to be energized unless properly **Locked, Tagged, Cleared, and Tried.**
3. Disconnect power sources, test voltage, and grounding when isolating electrical power equipment and circuits operated at 480 volts (V) or higher.
4. Do not work alone on energized electrical equipment except as permitted by Saudi Aramco requirements.
5. Use proper PPE as required in GI 2.721 when conducting electrical work that could involve exposure to an electrical arc flash. Additionally, mats

and blankets shall be required to provide insulation from other elements that are energized.

6. Visually inspect and perform an air test on rubber insulating gloves prior to each use. Test and tag insulated/insulating protective equipment and hot sticks per Saudi Aramco requirements using a qualified testing laboratory.
7. Do not wear rings, wristwatches, other jewelry, eyeglasses with metal frames, or other similar metallic objects while working within an arm's reach of rotating or energized electrical equipment.
8. Maintain safe distances per Saudi Aramco requirements (see Table 1) when working near energized electrical equipment.
9. Ground noncurrent carrying metal parts of electrical equipment to prevent discharge of electricity.
10. Do not bypass or defeat any electrical interlocks by removing, modifying, or destroying them.
11. Remove blown fuses with approved fuse pullers and replace only with the proper type and rated fuse.
12. Use only nonconductive ladders (e.g., fiberglass) when working on or near energized electrical equipment or conductors.
13. Use residual current devices (RCDs), including ground fault circuit interrupters (GFCIs) and earth leak circuit breakers (ELCBs) for all 110/220 V portable electric power tools and temporary wiring installations.
14. Do not use electrical wiring or equipment in electrically classified (hazardous) areas unless designed and installed for the specific service required. Only use equipment in electrically classified locations that is properly rated and marked to show the class, group, and operating temperature for which it is approved.

Table 1. Minimum Safe Distances from Energized Equipment

Nominal Phase-to-Phase Voltage, kV	Minimum Safe Distance from Live Parts			
	To Worker		To Parked Vehicle	
	cm	inches	cm	inches
0.48	31	12	62	24
2.4, 4.16, 13.8	61	24	122	48
34.5	92	36	153	60
69	107	42	214	84
115	122	48	244	96
230	153	60	244	96

15. Update electrical panel board lists frequently in order to quickly identify breakers for proper isolation in the event of an emergency.
16. Do not use electrical or battery rooms as storage or resting areas.

Energized Overhead Power Lines

1. Consider all power lines as energized until testing and grounding has confirmed they have been de-energized.
2. Check equipment and circuits for electrical potential after isolation and protective grounds have been applied.
3. Verify the operating voltage of overhead power lines and equipment prior to performing work on or near energized parts.
4. Erect guards or barriers (e.g., timber "goal posts") to maintain required clearances when cranes or heavy

equipment are operating near or in transit under energized overhead power lines.

5. Obtain clearance from the responsible Saudi Aramco organization prior to performing work on overhead power lines.
6. Ground all heavy equipment/vehicles positioned near overhead power lines for any type of work.
7. Use approved hot sticks and integral poles (as part of a grounding set) to install and remove grounding cables.
8. Visually inspect live-line tools, including hot sticks, before each use to identify defects, manufacturer's certification, and valid test date. Remove defective tools from the job site immediately.
9. Maintain the minimum distances indicated in Table 2 when any part of the crane, boom, mast, gin pole, or machinery of cranes or heavy equipment are used near or in transit under energized overhead power lines.

Table 2. Minimum Safe Distance from Overhead Power Lines

Line Voltage	Minimum Approach Limits
Up to 50,000 V	3.1 m (10 ft)
50,000 to 200,000 V	4.6 m (15 ft)
200,000 to 350,000 V	6.1 m (20 ft)
Over 350,000 V	7.6 m (25 ft)

Excavation and Trenching

Apply the following minimum safety and health precautions when designing, constructing, or working on or near excavations or trenches.

An Excavation Safety Checklist (see CSM II-1, Excavations and Shoring) is required for:

- All excavations 1.2 m (4 ft) and deeper.
- Excavations deeper than 30 cm (1 ft) where buried pipelines or cables may be present.

Note: Entry into excavations 1.2 m (4 ft) and deeper will require a CSE permit as outlined in Operational Safety Process 3: *Confined Space Entry Permit.*

Requirements for Excavation Design

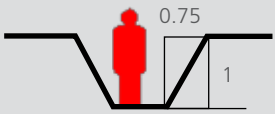
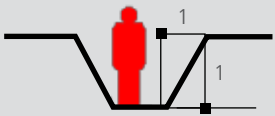
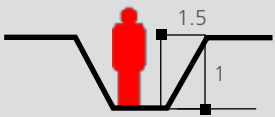
1. Design excavations using an excavation competent person, including:
    - Determine the soil type prior to entry (i.e., stable rock, or Type A, B, or C soil) as described in Table 3.
    - Determine the appropriate method of protection against sidewall cave-in — benching, shoring, or sloping, or a combination of methods depending on space available, nature of operations, and soil type. If sloping is used, follow Table 3.

Note: An excavation competent person is one who is able to successfully demonstrate to Saudi Aramco that they have the knowledge, training, and experience to properly identify existing and predictable hazards, soil types, and working conditions that are unsanitary, hazardous, or dangerous to personnel.

2. Develop an excavation plan by a degreed engineer for the following:
    - Excavations greater than 2.4 m (8 ft) deep in Type B or C soil.

- Excavations greater than 6 m (20 ft) deep regardless of soil type.

Table 3. Maximum Allowable Slopes for Height (h) less than 6 m (20 ft)

Soil Type	Cross Section
Stable Rock — Natural solid mineral matter.	
Type A Soil — A cohesive (tight) soil, such as clay or rock. Previously disturbed Type A soil becomes Type B or Type C soil.	
Type B Soil — A less cohesive soil such as a mix of sand, rocks, and clay. Previously disturbed Type B soil becomes Type C soil.	
Type C Soil — The least cohesive soil, such as gravel, sand, muddy or freely seeping soils, and submerged rock that is not stable.	

Requirements for Excavation Construction

1. Identify all utilities and lines and notify appropriate parties before beginning any digging or cleanup work.
2. Locate spoil piles at least 0.6 m (2 ft) from the edge of the excavation.

3. Position scaffold bases at least 1.5 times the depth of an excavation away from the edges of the excavation (including trenches).
4. Do not use mechanical excavators within 3 m (10 ft) of any underground pipes, cables, or other obstructions.
5. Do not operate motor vehicles or heavy equipment within 2 m (6.5 ft) or the depth of the excavation (whichever is greatest) for any excavation.

   Note: With the exception of excavating and backfilling equipment (e.g., trackhoes, rock breakers, backhoes, and front end loaders).
6. Do not operate cranes closer than the depth of the excavation for Type A soils, and no closer than two times the depth of the excavation for Type B and C soils.
7. Perform a documented excavation inspection using an excavation competent person for the following:
   - Before initially entering an excavation or after a change in site conditions.
   - Each morning for excavations greater than 2.4 m (8 ft).
8. Erect barricades a safe distance from the excavation to protect individuals and mobile operating equipment above the excavation, or if the excavation is left unattended overnight.
9. Provide blinking warning lights at excavations during hours of darkness where there is personnel or vehicle movement.

Requirements for Personnel in Excavations

1. Enter an excavation only if you are authorized to do so.
2. Position personnel within the excavation outside the operating radius of any operating excavating equipment.

3. Position personnel in an excavation where they will not be exposed to a possible cave-in, and not within a distance less than the depth of the excavation away from the edge where equipment is located.
4. Ensure there is no water seepage into the excavation.
5. Provide ladders or other means of access so that there is no more than 7.5 m (25 ft) of lateral travel distance for personnel in all occupied excavations. Ladders shall extend a minimum of 1 m (3 ft) above the top of excavation wall.
6. Ensure there is an emergency rescue plan for excavations considered as confined spaces.

Fall Protection

Fall protection systems include *fixed* fall protection systems (i.e., temporary scaffolding or permanent platforms with a complete guardrail system consisting of toprails, midrails, and toeboards provided at all open edges) and *personal* fall arrest systems. See the *Scaffolding* safety topic for additional information on temporary platforms.

Each person who could fall more than 1.8 m (6 ft) must be protected from falling by an approved fall protection system.

Personal Fall Arrest Systems

1. Personal fall arrest systems include a full-body harness (see Figures D-E), shock-absorbing lanyard or self-retracting lifeline, suspension trauma straps, and a substantial anchor point and/or horizontal/vertical lifeline.
2. Wear personal fall arrest systems continuously when working at heights when exposed to a fall hazard of 1.8 m (6 ft) or greater.
3. Wear personal fall arrest systems when working on unprotected elevated areas, yellow-tagged scaffolds, and aerial lifts.
4. Use personal fall arrest equipment that meets Saudi Aramco requirements and is labeled as such.
5. Use fall protection equipment appropriate for the work situation and according to the manufacturer's intended use.
6. Keep fall protection equipment clean, in good condition, and stored properly when not in use.
7. Use shock-absorbing lanyards that are either "Y" lanyards (two lanyards sharing a common deceleration device) or double-leg lanyards (two lanyards each with their own deceleration device).

8. Do not use equipment designed solely for use as a fall restraint or positioning system.
9. Do not use safety belts as parts of a fall arrest system. Only use safety belts when climbing poles or tree trunks.
10. Use suspension trauma straps (foot stirrups) with each full-body harness in order to stand up in the harness and prevent loss of circulation if involved in a fall. See Figure F.
11. Use self-closing and self-locking snap hooks and carabiners.
12. Inspect fall protection equipment, including full-body harnesses, lanyards, and D-rings prior to each use. Remove defective components from service.
13. Attach lanyards to an anchor point or horizontal/ vertical lifeline that is high enough to prevent you from striking a lower level during a fall.
14. Do not connect lanyards together, tie into knots, or tie them back onto themselves (unless designed for this use).
15. Use beam wraps (cross arm anchorage connector) when tying around an "H" or "I" beam. Do not use rope lanyards for tying around beams.
16. Maintain 100% tie-off when working at heights. Keep at least one leg of the lanyard attached to an anchor point at all times.
17. Wrap lanyards around the body or otherwise secure them when not in use to prevent tripping or snagging.
18. Use self-retracting lifelines (inertia reels) when a longer lanyard is needed. Connect self-retracting lifelines directly to the D-ring on the full-body harness.

19. Remove fall arrest equipment from service if it has been subject to impact loading from stopping a fall. Refurbish and test self-retracting lifelines by the equipment manufacturer prior to reuse.

Anchor Points and Lifelines

1. Use anchor points that can safely support 2,268 kg (5,000 lb) – about the weight of a car.
2. Do not anchor lanyards to standpipes, vents, small diameter piping, cable trays, or electrical conduit.
3. Remove or cover rough or sharp edges that may come in contact with webbing of a full-body harness or lanyard.
4. Use horizontal lifelines (i.e., wire rope) that have a minimum diameter of 13 mm (1/2 inch), and vertical lifelines that have a minimum diameter of 10 mm (3/8 inch). Do not use materials such as manila, nylon, or polypropylene rope for horizontal lifelines.
5. Ensure the horizontal lifeline has a safety factor of at least two (2) against failure and has been designed by a structural engineer.
6. Use tension lifelines to prevent an unloaded sag at the center of the lifeline greater than 30 cm (12 inches) for every 10 m (33 ft) of lifeline length.
7. Attach no more than three (3) persons at one time to a *horizontal* lifeline between anchor points unless designed accordingly.
8. Attach only one person at a time to a *vertical* lifeline.
9. Ensure that lifelines are free of splices, installed at the highest possible point (i.e., above shoulder height), and are removed when no longer needed.

Figure D. Full-Body Harness (Front)

Chest strap with pass-through adjuster buckle

Identification and wearer instruction label

Side D-rings for restraint or positioning (if present)

Leg strap adjuster buckles

Leg strap

Figure E. Full-Body Harness (Back)

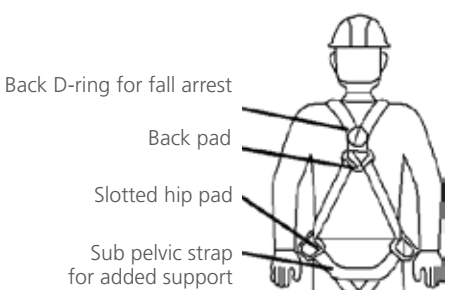


Figure F. Suspension Trauma Straps

Temporary Working Surfaces

1. Inspect all elevated work surfaces prior to use.
2. Provide guards/barricades or securely cover floor holes and openings, including grating that has been removed and open vaults.
3. Do not stand on a guardrail or work from a ladder in close proximity to the edge of an elevated platform.
4. Install protective screens between the toeboard and guardrails when there is a danger of personnel being struck by falling objects (e.g., tools, materials, or equipment stacked higher than the top of the toeboard).
5. Do not obstruct walking surfaces or create tripping hazards with electrical cords, welding cables, hoses, etc. Support these items overhead when possible.

Elevating Work Platforms (Manlifts)

1. Operate elevating work platforms (manlifts – hydraulic/scissor/telescoping) only if certified.
2. Verify that manlifts have a current Saudi Aramco inspection sticker.

3. Use a second person to guide the operator (i.e., spotter) while moving from one location to another.
4. Maintain an appropriate clearance from overhead obstructions while raising or lowering the manlift.
5. Modification of manlifts is prohibited without written consent from the manufacturer.
6. Use manlifts designed for their appropriate location/terrain (i.e., indoors or outdoors).
7. Use outriggers on any manlift equipped with them.
8. Wear a full-body harness with lanyard attached to an anchor point on the manlift.
9. Fully close and secure shut all entrance gates or chains before moving or raising the manlift.
10. Do not carry/transport equipment and tools on manlifts designed only for personnel transfer.
11. Ensure the anti-entrapment device is installed and operational.

Ladder Safety

1. Use self-supporting portable ladders that are rated to support four (4) times the maximum intended load.
2. Inspect all ladders before use and remove defective ladders. Examples of unacceptable damage include:
    - Split or broken side rails.
    - Missing or damaged rungs.
    - Bent or missing hinges.
    - Other damage that affects the safe use of the ladder.
3. Extend ladders a minimum of 1 m (3 ft) above the top landing point.
4. Set straight ladders and extension ladders at a slope of 4:1. Place ladder vertically only if both side rails are

secured to a supporting structure (e.g., scaffold).

5. Secure ladders at the top and provide stable footing on a level surface. Do not use boxes, blocks, or temporary platforms (e.g., scaffolds) as a means of support.
6. Do not use ladders in a horizontal position as a platform, walkway, or scaffold.
7. Allow only one person at a time on a ladder.
8. Station a flagman or a standby man when a ladder could be struck by moving vehicles, equipment, or adjacent doors.
9. Use wooden or fiberglass ladders for work near electrical equipment. Do not use metal ladders or ladders with metal reinforced or conductive side rails when working on or near electrical equipment or conductors.
10. Do not splice, lash, tie, or fasten together ladder sections to provide longer sections.
11. When working from a ladder, face the ladder and maintain three points of contact at all times.
12. Face the ladder when climbing and descending.
13. Use other methods such as scaffolds or personnel lifts instead of ladders if the work is long term in nature or requires heavy physical exertion.
14. Descend the ladder in order to move, shift, or extend the ladder.
15. Never work off the top step of a stepladder, or stand on its nonstep (brace) side.
16. Open a stepladder fully and lock/secure cross-braces before use.
17. Do not use stepladders as an upright or straight ladder. "Flip-up" type stepladders are prohibited.

Fire Protection

Response Procedures in Case of a Fire

1. Call for help/sound an alarm.
2. Operate fire extinguishers and equipment only if you are trained in their use.
3. Ensure that all personnel are evacuated per the local emergency response plan.
4. Isolate all fuel sources and/or threatened facilities and close doors; do not attempt to extinguish gas fires.
5. Do not fight fires beyond the incipient (initial) stage or beyond your level of training.
6. Locate the firefighting equipment and approach the fire from the upwind side.
7. Never operate an extinguisher in such a manner that any part of your body is located directly above the fill cap.
8. Test the extinguisher before attempting to extinguish the fire.
9. After the fire is extinguished, stand by to make sure the fire does not start again (reignites).

Fire Prevention Guidelines

Take the following precautions to prevent ignition of materials, lubricants, and fuels used at job sites and work locations:

1. Check electrical equipment regularly for defects.
2. Do not smoke or use mobile phones or other electrical devices (not classified as intrinsically safe) while refueling equipment.
3. Segregate welding equipment, asphalt kettles, heating appliances, and other open flames or hot surfaces from flammable and combustible materials.

4. Minimize the storage of Class A fire materials (e.g., paper and wood) in process and electrical areas.
5. Obtain authorization from the Saudi Aramco Fire Protection Department (FrPD) for any open fires and/or open burning of materials.
6. When transferring hydrocarbons (flammable liquids) from a line or vessel to another container, make sure the source container and the receiving container are electrically bonded to prevent ignition due to static electricity.
7. Always fill portable gasoline containers on the ground and never place gasoline containers inside vehicle passenger compartments.
8. Report and repair all hydrocarbon liquid or gas leaks immediately.
9. Immediately remove ignition sources (e.g., shut down engines) if there is a hydrocarbon release.
10. Use noncombustible or flameproof welding screens around/under cutting, welding, or burning operations that are next to (or above) hydrocarbon operations or flammable/combustible materials.
11. Inspect and test all fire detection (smoke detectors, alarms) and fire protection (fire extinguishers, fire monitors) equipment per Saudi Aramco requirements.
12. Do not use gasoline as a cleaning agent.
13. Do not use plastic containers for collecting hydrocarbon samples.

Hand Tools and Power Tools

Apply the following safety precautions to the selection, use, and care of hand tools and power tools, both portable and fixed.

Safe Operation

1. Wear appropriate PPE at all times when using hand tools and power tools.
2. Do not operate any tools unless you are appropriately trained in their use, inspection, and storage.
3. Do not use homemade tools.
4. Inspect tools before and after use, as well as before storage. Maintain tools in good operating condition and store tools using racks or boxes.
5. Do not use defective or deformed tools and immediately tag and remove defective tools for repair or disposal.
6. Use only insulated or nonconductive tools when work is performed on or near electrical equipment. Routinely inspect the insulation integrity of tools used for work on electrical equipment.
7. Use only tools specifically designed to be struck by hammers for that purpose.
8. Do not use cheater bar extensions.
9. Ensure that blades for saws are suitable for the material to be cut. Protect blades of hand saws with a piece of timber or sheath when not in use.
10. Ensure that start/stop buttons are positioned at the operator's location, within easy reach, and located to minimize inadvertent operation.
11. Ensure that shafts for tools (hammers, picks, shovels) are free of cracks, splinters, and other defects, and are firmly attached to the head of the tool.

12. Use hydraulic jacks that are rated higher than the load. Place hydraulic jacks on level supports or foundations and support the load with blocks once it is raised to the proper height.

Portable Power Tools

1. Use power tools that are equipped with functioning constant pressure switches, or controls that will shut off the power when released (i.e., a deadman switch). Do not use power tools that are equipped with trigger locks.
2. Do not remove protective shields/guards which are supplied with tools (by design).
3. Disconnect power tools from the power source before changing bits, blades, cutters, or wheels.
4. Do not use portable electric power tools that are rated for use at a voltage exceeding 240 volts (V).
5. Ensure that power sources and electric tools are of a single voltage (110 V or 220 V nominal) within a job site or operating area. Match tools and extension cords to the supplied power source voltage.
6. Use only electric power tools that have been certified by an independent testing and certification service and bear the appropriate certifying agency mark. Tools are certified as a complete unit; do not alter or modify tools.
7. Use portable electric power tools that are insulated or properly grounded with a manufacturer installed three-prong plug.
8. Do not use plug adaptors. Match the plugs of electric tools with the power source outlet.
9. Ensure that tools and extension cords have an overcurrent protection device (e.g., panel mounted circuit breaker or in-line fuse).

10. Use extension cords that have appropriate grounding pins and blades, are of three-wire conductor type, are rated for outdoor use, are as short as possible, are not daisy chained, and do not use extension cords for permanent wiring.
11. Use a certified electrician for the fabrication of any job-made extension cords as well as any repairs to an extension cord. Fabricate and repair extension cords to appropriate industry and company standards.

Residual Current Devices (RCDs)

1. Use residual current devices (RCDs), including ground fault circuit interrupters (GFCIs) and earth leak current breakers (ELCBs) for all 110/220 V portable electric power tools.
2. Use RCDs that have a maximum rated tripping current of 10 mA, are suitable for the environment, and installed as close to the power source as practicable (e.g., at distribution board/panel).
3. Visually inspect and check the function of the RCD daily by operating the test button when using portable electric power tools.
4. Test RCDs every three months using a competent person with appropriate test equipment — that simulates a ground/earth fault current — to trip the device being tested.

Grinding Tools

1. Check grinding wheels to ensure they are free of defects before installing. Discard or destroy defective wheels.
2. Inspect and ring test wheels used on fixed grinders before installing the wheel.
3. Use and maintain safety guards at all times. Ensure that guards allow only the working part of the wheel to be exposed.

4. Provide floor and bench-mounted grinders with work rests that are rigidly supported and adjustable. Work rests must be no greater than 4 mm (1/8 inch) from the surface of the wheel; tongue guards must be no greater than 7 mm (1/4 inch) from the surface of the wheel.
5. Do not use the sides of the abrasive wheel as a grinding surface.

Portable and Fixed Saws

1. Use hand-operated circular saws (e.g., Skilsaws) that are fitted with a retractable spring-loaded guard that allows only the working part of the blade to be exposed.
2. Use portable table saws that are provided with adjustable guards, anti-kickback devices, and are secured against movement.
3. Use fixed table saws for ripping that have anti-kickback devices and a riving knife (kerf spreader).
4. Use "push sticks" during the last 30 cm (12 inches) of any cut when using a fixed table saw.
5. Use chop/miter saws that have a locking clamp to secure the work piece and a deadman finger operated start button.

Hazardous Materials

Apply the following minimum precautions for the safe storage, handling, and use of hazardous materials. See additional information on the safe use and handling of hazardous materials in the *Compressed Gas Cylinders* and *Fire Protection* safety topics.

Handling and Use of Hazardous Materials

1. Take the necessary precautions to prevent the swallowing, inhalation, or skin contact of hazardous materials.
2. Use appropriate PPE (including respiratory equipment) as provided in the relevant chemical hazard bulletin (CHB) or safety data sheet (SDS).
3. Use respiratory protection equipment when chemical concentrations in the air exceed allowable exposure limits. Ensure ventilation (mechanical or natural) is provided when handling volatile liquids.
4. Do not smell or taste chemicals or eat, drink, smoke, or chew gum in areas where chemicals are present.
5. Do not mix incompatible chemicals.
6. Use proper lab equipment when mixing chemicals.
7. Do not smoke or use devices not classified as explosionproof near flammable liquids.
8. Wash hands thoroughly after handling chemicals or hazardous substances.
9. In case of eye or skin contact, promptly flush affected area(s) with clean water for at least 15 minutes, remove contaminated clothing, and seek medical attention.
10. Clean spills promptly while wearing appropriate PPE, and properly dispose of all contaminated materials per Saudi Aramco requirements.

Storing and Labeling Hazardous Materials

1. Apply labels to each hazardous material container to indicate its contents and hazards, including portable containers used to transfer materials.
2. Maintain a complete inventory (list) of all current chemicals and products (liquids, solids, powders, gases) at the facility or project site.
3. Ensure that CHBs or SDSs are readily available for each chemical on site.
4. Store flammable and combustible materials in shaded areas and in approved flammable liquid storage cabinets when stored indoors.
5. Periodically examine chemical containers for integrity.
6. Minimize the amount of hazardous materials stored at the job site or work area. Storing hazardous materials on bench tops or at high levels is not recommended.
7. Do not store incompatible chemicals (e.g., reactive substances near flammables) near each other.
8. Segregate toxic substances in a well-identified area with local exhaust ventilation.
9. Place highly toxic chemicals, whose containers have been opened, in secondary containment. Label secondary containers to indicate their contents and hazards.

Heat-Related Illnesses

1. Heat Cramps (an early warning sign for heat exhaustion).

   Treatment includes: Stop all activity; rest in a cool, shaded area; loosen clothing; drink water; and if symptoms persist, seek medical aid.

2. Heat Exhaustion (weakness; dizziness; sweating; rapid pulse; pale or flushed skin).

   Treatment includes: Move the victim to a cool place; call for medical help; loosen clothes; apply cool compresses; shower with cool water; and drink water or sport drinks that have electrolytes.

3. Heat Stroke (lack of sweating; high body temperature; chills; strong and rapid pulse; confusion; weakness; nausea; and loss of consciousness).

   Treatment includes: Treat as a medical emergency and call for a doctor immediately; move to a cool, shaded area; cool the body with water; and have the victim lie flat with feet elevated.

Any employee experiencing symptoms of a heat-related illness shall be allowed to fully recover in an appropriate recovery area before returning to work. Victims of heat exhaustion or heat stroke shall be immediately evacuated to the nearest medical facility for treatment.

Site Management/Supervisors

1. When the potential for heat-related illness exists, monitor environmental conditions (i.e., air temperature, humidity) and communicate the current heat stress danger category (see Table 3) and necessary control measures to personnel.
2. Develop a work plan to avoid heat-related illness

during periods of high heat stress potential. This plan may include:

- Scheduling work during the cooler times of the day and work/rest rotations.
- Providing measures (e.g., shading and ventilation) when work in direct sunlight is required.
- Monitoring employees for symptoms of heat-related illness.
- Communicating to workers the locations of designated break/recovery areas and emergency procedures.
- Adjusting work/execution plans (e.g., use mechanical/powered equipment to replace manual labor) as practical.

3. Do not let schedule or productivity demands supersede heat stress awareness or controls.
4. Conduct periodic (e.g., weekly) safety meetings/talks and distribute educational information on heat stress hazards and precautions.
5. Provide drinking water stations and designated shaded and cool areas for periodic "cool down" breaks for workers.
6. Periodically determine (e.g., every hour) the actual heat index at the work site using calibrated weather monitoring equipment when the potential for heat-related illness exists.
7. Communicate the current heat stress danger category and corresponding control measures to employees as conditions change.

Employees

1. Follow instructions for controlling heat stress, including taking periodic "cool down" breaks and drinking enough water.

2. Wear appropriate clothing (e.g., light colored, lightweight, breathable, loose clothing is best).
3. Know and be alert for signs/symptoms of heat-related illnesses.
4. Take appropriate action upon developing symptoms of heat cramps, heat exhaustion, or heat stroke.

Control and Prevention of Heat Stress

During periods of high heat stress potential at the work site, implement measures as applicable to control heat stress. As with any hazard, feasible engineering controls are the primary control measure, followed by administrative (work practice) controls and personal protective equipment controls.

Engineering controls include:

1. Shaded break/rest areas – at a distance not greater than 100 m (330 ft) from personnel working in direct sunlight.
2. Local ventilation – fans or portable air movers may be used when temperature is less than 37 °C (99 °F).
3. Portable air cooling systems – for cooling confined spaces and similar enclosed work areas.

Administrative controls include:

1. Scheduling – work during cooler times of the day.
2. Acclimatization – expose new employees to hot environment for progressively longer periods.
3. Water replacement (hydration) – supplies of drinking water located within 100 m (330 ft) walking distance of each worker.
4. Work/rest rotations – rest periods based on actual heat index (see Table 3).
5. Personal monitoring – personnel observe each other for signs of heat related illness.

Personal protective equipment controls include:

1. Ice cooling garments – ice vests, neck wraps, etc.
2. Clothing – light colored, lightweight, breathable clothing; work plans adjusted when personnel are required to wear flame resistant clothing (FRC).
3. Wetted clothing/towels – water supplies separate from drinking water to cool the body.

Table 3. Heat Index Guidelines and Calculation

Heat Index				
Danger Category	Heat Index	Heat Stress Illness/ Symptoms	Work:Rest Periods (Minutes)	Min. Water Needed *
IV. Extreme Danger **	52+	Heat stroke imminent.	20:10	1 cup every 10 minutes
III. Danger	39–51	Heat cramps, heat exhaustion or heat stroke likely with prolonged exposure and physical activity.	30:10	1 cup every 15 minutes
II. Extreme Caution	30–38	Heat cramps, heat exhaustion or heat stroke possible with prolonged exposure and physical activity.	50:10	1 cup every 20 minutes
I. Caution	25–29	Fatigue possible with prolonged exposure and/ or physical activity.	Normal/ Scheduled	1 cup every 20 minutes

* 1 cup = 250 ml ** See CSM Chapter I-13, Heat Stress, Section 13.4.2(F) for precautions

Air Temp °C	Relative Humidity								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
50+	**	**	**	**	**	**	**	**	**
50	48	**	**	**	**	**	**	**	**
49	47	**	**	**	**	**	**	**	**
48	45	**53	**	**	**	**	**	**	**
47	44	51	**	**	**	**	**	**	**
46	43	49	**	**	**	**	**	**	**
45	42	47	**	**	**	**	**	**	**
44	41	46	**52	**	**	**	**	**	**
43	40	44	49	**	**	**	**	**	**
42	39	42	47	**54	**	**	**	**	**
41	38	41	45	51	**	**	**	**	**

	40	37	39	43	48	**	**	**	**	**
	39	36	38	41	46	**52	**	**	**	**
	38	35	37	39	43	49	**55	**	**	**
	37	34	35	38	41	46	51	**	**	**
	36	33	34	36	39	43	48	**54	**	**
	35	32	33	35	37	41	45	50	**	**
	34	31	32	33	35	38	42	47	**52	**
	33	31	31	32	34	36	40	44	48	**54
	32	30	30	31	32	34	37	40	44	49
	31	29	29	30	31	33	35	38	41	45
	30	28	28	29	30	31	33	35	38	41
	29	27	27	28	29	30	31	33	35	37
	28	27	27	27	28	28	29	31	32	34
	27	26	26	26	27	27	28	29	30	31
	26	25	25	26	26	27	27	27	28	28

Heavy Equipment

Apply the following safety precautions when operating mobile heavy equipment such as, but not limited to, front end loaders, backhoes, excavators, boom trucks, scrapers, and roller compactors.

Safe Operation

1. Operate heavy equipment only if certified per the requirements of GI 7.025. (For equipment not listed in GI 7.025, Saudi Arabian Government requirements apply.)
2. Identify all utilities and lines and notify appropriate parties before beginning any digging or excavation work.
3. Do not operate gasoline or diesel powered equipment inside buildings.
4. Maintain distances in accordance with the *Crane Operations and Rigging Equipment* safety topic when operating heavy equipment around overhead power lines.
5. Ensure that ground personnel maintain a safe distance from operating equipment and establish eye contact with the operator before approaching.
6. Do not jump from the equipment to the ground when exiting.
7. Ride or work only on parts of the equipment that are specifically designed for personnel.
8. Designate a spotter (or a signal person) when visibility is obstructed and there is a risk of the equipment coming into contact with assets or personnel. Wear high-visibility (e.g., reflective) fluorescent vests when performing the duties of a spotter.
9. Latch and secure all parts of equipment before traveling (e.g., excavator or backhoe booms, dump bodies).

10. Do not operate mechanical excavators within 3 m (10 ft) of any pipeline or cable.
11. Do not leave heavy equipment unattended while it is running.
12. Shut off engines, apply parking brake, and chock wheels when equipment is left unattended, including overnight.
13. Lower any blades, buckets, scraper bowls, and other hydraulic equipment to the ground when it is left unattended. Remove ignition keys to prevent startup by unauthorized personnel.
14. Dismount from equipment while maintenance or repair work is being performed, unless otherwise instructed. Stop and deactivate equipment prior to performing repairs.
15. Do not sleep or rest under or near heavy equipment.

Equipment Condition

1. Ensure all heavy equipment has a functioning audible backup (reverse) alarm.
2. Maintain heavy equipment in good operating condition, including functional seat belts.
3. Keep all cab glass clean without obstructions or damage. Ensure cab glass is constructed of safety glass.
4. Ensure material handling equipment (e.g., bulldozers, loaders, and scrapers) is equipped with rollover protective structures (ROPSs).

Forklifts

1. Obtain training and certification per the requirements of GI 7.025 prior to operating a forklift.
2. Operate forklifts per the manufacturer's instructions. Do not use forklifts to tow or push equipment/objects,

or as a lifting device with rigging (e.g., lifting pipe).

3. Ensure the forklift has a valid inspection sticker.
4. Verify that forklifts have overhead protection (ROPS), seat belts, a fire extinguisher, and an audible backup (reverse) alarm.
5. Inspect forklifts before and after use, including the function of the backup alarm and safety devices.
6. Wear a seat belt when operating a forklift. Keep all parts of the body inside the forklift cabin.
7. Do not ride on a forklift unless you are the operator of the equipment.
8. Do not use forklifts to raise or lower personnel, or use as a work platform unless the forklift is fitted with an attachment certified by Saudi Aramco or an approved third party.
9. Do not allow any person to stand or walk under elevated forks, whether loaded or unloaded.
10. Transport all drums in the upright position, using a drum containment pallet, drum rack, basket, or with a drum handling extension. Do not move drums by sandwiching them between the forks.
11. Do not use forklifts beyond their rated lifting capacity.
12. Lower forks and shut off engine when the forklift is parked and unattended.
13. Operate forklifts only on stable road/surface conditions, unless designed for off-road conditions.
14. Operate forklifts on a level surface when transporting loads. Place loads in the uphill position when traveling up or down an inclined surface.
15. Carry loads low, with the forks raised no more than 15-20 cm (6-8 inches) off the ground and tilted back.

Hydrogen Sulfide

Hydrogen sulfide (H_2S) may be present in many Saudi Aramco operations areas, including oil and gas wells/plants/pipelines, septic tanks/sewers, and underground activities. The physical effects of H_2S in high concentrations may result in death (see Table 4). Contact your supervisor for additional information concerning H_2S procedures and/or emergency response plans.

H_2S Properties

Highly flammable, colorless, and toxic gas. Heavier than air and may accumulate in low places. Has a characteristic rotten egg odor at low concentrations. Affects the sense of smell at higher concentrations or longer exposures. Slightly soluble in water to form a weak acid. Reacts with oxidizers and reacts with metal to form metal sulfides (i.e., pyrophorics). When ignited, H_2S forms sulfur dioxide (SO_2) – a colorless, toxic gas.

Precautions

1. Do not rely on your sense of smell to detect H_2S.
2. Complete training in H_2S safety, first aid/basic life support (BLS), and air-supplied respiratory protection equipment prior to working in areas that may contain H_2S.
3. Display H_2S warning signs that identify the potential presence of H_2S in the area, and wind direction indicators to aid in evacuation if required.
4. Do not open or enter any pipeline, vessel, tank, or equipment that may contain H_2S without a prepared procedure, including:
    - Completed work permits.
    - Notifying all personnel in the immediate area.
    - Available standby personnel and respiratory protection.

- Calibrated H_2S-detection equipment and personal monitors.
- Contingency plan/emergency response procedures in the event of a release (includes preplanned escape routes).

5. Wear air-supplied respiratory protection equipment (self-contained breathing apparatus [SCBA], air-line respirator) when performing work in areas where H_2S concentrations have been detected at 10 ppm or greater.
6. Wear personal monitors in areas where personnel may be exposed to H_2S concentrations at 10 ppm or greater.
7. Upon hearing an H_2S alarm, immediately leave the area in an upwind or crosswind direction.
8. Do not enter or work in locations when the concentration has reached 100 ppm H_2S or more.
9. During H_2S emergencies/immediately dangerous to life or health (IDLH) conditions, never attempt to rescue an H_2S victim without the use of an SCBA, proper first aid/rescue training, and following the "buddy system" (i.e., working within line of sight of other rescue personnel).
10. Iron sulfide deposits (pyrophorics) may be found in tanks, vessels, and piping where H_2S has been present. Ensure the iron sulfide scale exposed to air is always kept wet to prevent ignition.

Table 4. Physical Effects of Hydrogen Sulfide

Concentration (ppm)	Effects
below 1	Odor threshold (similar to rotten eggs).
10	Eye irritation.
25	Strong odor. Pulmonary irritation begins.
50	Severe conjunctivitis with prolonged exposure.
100	Severe eye irritation and coughing. Loss of sense of smell in 1 to 5 minutes. Immediately dangerous to life or health (IDLH).
250	Pulmonary edema and gastrointestinal disturbance.
500	Dizziness and loss of consciousness possible within 30 minutes.
1,000	Immediate unconsciousness and death within minutes.

Materials Handling

Apply the following safety precautions when moving, handling, or storing materials at Saudi Aramco facilities or construction sites.

Site Storage

1. Ensure adequate firefighting equipment is available and accessible in the storage area(s).
2. Stack, rack, block, or otherwise secure any materials stored in tiers to prevent materials from sliding or falling.
3. Stack lumber in piles that do not exceed 4.8 m (16 ft) in height if the lumber is handled manually, or 6 m (20 ft) when handled with equipment.
4. Stack and block structural steel, poles, pipe, bar stock, and other cylindrical materials to prevent spreading or tilting.
5. Store materials on shelving rated for the load. Store small items in bins that are marked with their contents.
6. Post the safe loads and maximum stack heights allowed on racks.
7. Do not stack materials on racks/shelves to a height that interferes with fire protection sprinkler system capabilities (i.e., impedes the sprinkler head).
8. Maintain storage areas and walkways free of obstructions and debris. Keep aisles free for safe movement of materials handling equipment and personnel.
9. Provide ramps or grading to ensure safe movement of vehicles in storage areas that have multiple levels.
10. Post any warnings associated with hazardous materials stored in the location. Provide CHBs/SDSs of

all hazardous materials stored. See the *Hazardous Materials* safety topic for additional information.

Manual Handling

1. Use tools/lift-assist devices whenever possible.
2. Follow the four key practices for performing a proper manual lift:
    - A good grip.
    - A straight back.
    - Steady feet.
    - Arms close to the body.
3. Avoid any extreme range of motion and twisting your body when lifting.
4. Minimize your reach and the distance any load is carried.
5. Minimize the weight of any loads by using mechanical aids, balancing the contents, etc.
6. Keep objects as close to the body as possible.
7. Consider your physical limitations when performing tasks that require manual handling of materials.
8. Seek assistance when performing tasks that may be beyond your capabilities.
9. Store heavy materials that are required to be lifted manually below waist height.

Handling Tubular Goods

1. All personnel not assisting in the operation shall stand clear of the loading/unloading area.
2. Conduct land-based loading/unloading on level ground wherever possible.

3. Drivers shall check in with the person in charge upon entering the facility, work area, or well location.
4. Properly secure all loads during any truck trailer movement at the loading/unloading location.
5. The carrier is responsible for providing sufficient load securing equipment (e.g., chains, straps, and stakes).
6. The driver is responsible for positioning the load on the trailer and breaking the load.
7. Follow proper guidelines for loading, checking, and unloading pyramid or stripped loads.
8. For pipe removed in bundles, the pipe shall be bundled/slung in approximately equal loads.
9. For pipe removed with S hooks, caution shall be taken to ensure the S hooks remain engaged. No more than four joints shall be picked up at any one time.
10. The loading and unloading practices for onshore operations are applicable to offshore operations. The captain of the marine vessel is responsible for the positioning, space, and weight conditions of the vessel.

Office Safety

The following safety precautions are recommended when working in office areas. Conduct quarterly inspections of offices per the organization's facility inspection schedule to ensure a safe working environment.

Workstations

A workstation consists of the equipment and furniture associated with a typical office area/control room (i.e., desk, chair, and computer components).

1. Maintain a neutral posture and sit upright when at your workstation. Sit as far back in your chair as possible and make sure the chair is adjusted to provide adequate support to your back.
2. Keep elbows in and vertically under your shoulders at a 90 degree angle. Ensure your forearms are level (horizontal) when using the keyboard.
3. Keep your wrists in a straight neutral position. Use wrist supports made of a padded material.
4. Avoid extended reaches and ensure the chair height allows your feet to rest flat on the floor or on a footrest.
5. Place the computer's monitor 50-70 cm (20-28 inches, about one arm distance) away from your face.
6. Position the monitor at eye level or slightly lower, so the center of the screen is approximately 15-25 degrees below your line of vision.
7. Use a headset or speakerphone if you use the telephone for extended periods of time.
8. Take regular breaks when working at a computer for long periods of time.

Office Areas

1. Arrange office furnishings in a manner that provides unobstructed areas for movement.
2. Prevent slips, trips, and falls in the office area by clearly marking any difference in floor level, securing throw rugs and mats to prevent slipping hazards, and cleaning up fluid spills.
3. Never climb on desks, chairs, cabinets, shelves, or boxes. Use an approved ladder.
4. Do not use a ladder in front of a door unless the door is locked and barricaded, or a standby man is positioned on the other side of the door.
5. Take care when sitting in a chair with rollers. Make sure it does not roll out from under you when you sit down.
6. Ensure that all chair feet/castors remain firmly on the ground when seated. Repair or report any chair damage that could be hazardous.
7. Ensure that electrical cords and phone cords do not cross walkways or otherwise pose a tripping hazard. If you cannot move a cord, have a new outlet installed or secure the cord to the floor with cord covering strips. Do not tape cords down or run them underneath carpet.
8. Do not roll chairs over electrical cords.
9. When using file cabinets, open only **one** drawer at a time to keep the cabinet from toppling. Close drawers when they are not in use.
10. Do not place heavy objects on top of cabinets. Be aware that anything on top of a cabinet may fall off if a drawer is suddenly opened.
11. Do not store hazardous materials or chemicals in the office area.

12. Do not place items on shelves within 45 cm (18 inches) of the ceiling. This space will allow ceiling sprinklers (if present) to function properly in a fire.
13. Close hand-operated paper cutters after each use and activate the guard.
14. Avoid wearing loose clothing, neck ties, scarves, or having long, loose hair within an arm's reach of rotating machines with unguarded moving parts.
15. Take care when working with copy machines. If you have to open the machine for maintenance, repair, or troubleshooting, remember that some parts may be hot.
16. Unplug paper shredders before conducting maintenance, repair, or troubleshooting.
17. Unplug defective machines and have them repaired immediately. Do not use any machine that smokes, sparks, or appears defective in any way.
18. Ensure that glass doors have some type of marking to keep people from walking through them.

Offshore Safety

1. The person in charge (captain/master of a marine vessel or barge, rig foreman of a mobile offshore drilling rig) is responsible for all onboard safety at all times. Follow the instructions of the person in charge, or his designee.
2. When offshore, comply with applicable onshore safety standards and the specific organization's procedures for working on and around offshore facilities.
3. When visiting marine vessels/barges/offshore drilling rigs, first report directly to the person in charge and provide all requested information, including swimming ability.
4. Receive from the person in charge a safety orientation explaining site hazards, offshore safety signs/color codes, and emergency life-saving equipment, including personal flotation devices (PFDs). Wear a PFD when working from, boarding, traveling aboard, and disembarking a boat, vessel, or barge.
5. Do not board or disembark from a vessel/barge/offshore rig or platform until the person in charge has given permission and provided safe access to the landing area.
6. Never go outside the vessel's/barge's guardrail unless authorized by the person in charge.
7. If a person falls in the water, immediately shout "**man overboard.**" Assist in the rescue as directed by the person in charge.
8. Be aware of slippery surfaces, including newly painted decks, wet decks, and decks with oily patches.
9. Be aware of mooring ropes and wires that are under tension and can cause serious injury.

10. During crane operations, be aware that the vessel is affected by wave action and passing vessels; this will affect the control of loads to be lifted.

Transfer by Personnel Basket

1. Wear a snugly fitted and securely fastened Type-I life jacket during transfer by a personnel basket.
2. Position yourself on the deck as directed by the boat crew.
3. Place only personal articles in the bottom center of the basket. Do not transfer heavy equipment or tools in a personnel basket.
4. Place one foot on the outside basket rim and grasp the basket ropes securely with both hands, keeping knees slightly bent. As the basket is lifted off the deck, step onto the outside basket rim with the other foot. Stand up straight and do not lean in or out.
5. Prepare for unexpected moves, particularly in rough seas.
6. Do not use a personnel basket for transferring personnel when the wind speed exceeds 25 km/h (14 knots), or in rough weather.

Transfer from Boat to Landing

1. Complete training in swing rope transfer prior to transferring from a boat using this method.
2. Wear an approved PFD.
3. Face towards the landing area.
4. Have both hands and arms free. Do not carry any luggage, tools, or equipment while transferring by swing rope.
5. Catch the knotted rope when the vessel/boat is on top of a swell and swing to the boat or platform by pushing off the boat with your feet.

6. Assist others in transfer by swing rope if directed by the person in charge.

Work On, Over, or Near Water

1. Obtain a water survival certification prior to working over or near water.
2. Wear a PFD when working over or near water.
3. Use a personal fall arrest system including full-body harness, lanyard, and safety line, when needed.
4. Ensure that standby personnel tend safety lines.
5. Ensure life rings are made available for rescue.
6. Use the "buddy system." Never work alone.

Pressure Testing

Apply the following minimum safety requirements when conducting pressure testing of equipment or piping.

Test Preparation and Equipment

1. Obtain an approved test procedure, if required, prior to the test. Test procedures are not mandatory for pressure tests on household utilities, irrigation systems, and pneumatic leak tests on reinforcing pads per Saudi Aramco requirements.
2. Pressure test procedures must include:
    - Safety instruction sheets, pressure test or hydrostatic test diagrams, and the test manifold arrangement.
    - A blind list.
    - Locations of check valves and air vents.
    - Locations of lowest-rated components that determine the test pressure.
    - Relief valve and vacuum valve (if any) sizes and set pressures.
    - Test medium (fluid, gas, additives) and location of filling points.
    - Special support requirements of equipment/piping being tested, safe clearance distances, and locations of barricades and warning signs.
    - Pressure test sequence, intervals, and duration of pressure increase and points of inspection.
    - Contingency/emergency plans.
3. Complete a *Checklist for Pressure Testing Safely* (see GI 2.102) before, during, and after the test.
4. Review all CHBs/SDSs for all chemicals handled during pressure testing activities.

5. Locate relief valves on the systems to be tested, including near the test pump. Tag relief valves with the set pressure, valid test date, and the word "TEST."
6. Remove or car seal open all block valves installed on the inlet and outlet of relief valves.
7. Install vents at high points in the system to vent air/gas while the system is being filled with the test liquid. Install drains to allow removal of test liquid when the test is finished.
8. Use two or more calibrated pressure gauges on the system under test; one must be located within eyesight of the pump operator. Verify that gauges have been calibrated within 30 days prior to the test.
9. Disconnect and/or blind equipment or piping that is not being pressure tested.
10. Install restraints to restrict movement of the piping and joints during the test.
11. Provide safety chains (or equivalent) on hoses connecting the test pumps to manifolds in order to prevent whipping in case a coupling becomes disconnected.
12. Test any pressure-testing manifolds separately from other piping, and to a pressure not less than 20% above the maximum test pressure to be applied on the system when the pressure test occurs.
13. Do not overload supports, vessels/piping, and any foundations due to the weight of the test liquid. Consult with Saudi Aramco Consulting Services Department and provide temporary supports, if necessary, to ensure the system under test can withstand the weight of the test liquid.

Conducting Pressure Tests

1. Allow only personnel involved with the pressure test near the system at any time during the test.

2. Vent hazardous gases or vapors clear of any areas where personnel are working or possible ignition sources.
3. Do not leave test pumps unattended while in operation, unless they are isolated from the system.
4. Provide vent relief capacity to ensure vessels are not subject to vacuum during the draining of test fluid.
5. Keep test relief valves installed until the test liquid has been completely drained to prevent possible overpressure due to thermal expansion.
6. Raise pressure in a gradual and controlled manner. Use 10-minute holds at each pressure increase step to allow time for material to strain and for personnel to check for weaknesses and leaks.
7. Do not exceed pressures specified by Saudi Aramco requirements (see GI 2.102) until weaknesses have been repaired and leaks have been stopped.
8. Depressurize the system being tested before any work is performed to stop leaks or repair weaknesses, including the tightening of bolts. During a tightness test, bolts may be tightened if approved in the written procedure.
9. Do not depressurize the system by loosening bolts or fittings.
10. Obtain an approved written procedure per Saudi Aramco Engineering Procedure 327, for the disposal of pressure-test liquids containing chemical additives.

Radiation Safety

Working with Ionizing Radiation Sources

1. Only perform work involving ionizing radiation if in possession of a valid Saudi Arabian Government (SAG) issued Radiation Practice License.
2. Perform work under the control of a licensed Radiation Protection Officer (RPO) approved by the Saudi Aramco Environmental Protection Department.
3. Perform activities involving radioactive sources with approved work permits and within controlled areas where barricades and warning signs are installed.
4. Complete training in the safe use and handling of ionizing radiation sources.
5. Use PPE and personal monitoring equipment while using/handling ionizing radiation equipment.
6. Periodically calibrate radiation monitoring and survey equipment per Saudi Aramco requirements.
7. Dispose of radioactive waste per SAG and Saudi Aramco regulations and standards.
8. Survey radiation sources before and after their use or movement. Conduct annual surveys on ionizing radiation equipment and sources.
9. Provide security measures to prevent the loss or theft of radiation sources from shielded storage rooms/facilities.
10. Maintain Saudi Aramco requirements regarding shielding, penetrations, monitoring, safety interlocks, warning signs, etc., for all rooms/facilities housing radiation emitting equipment.
11. Limit access to authorized personnel only when operating radiation equipment or during source exposure in rooms/facilities.

12. Immediately stop all radiographic work if unauthorized personnel enter a controlled area.

Industrial Radiography (Nondestructive Testing [NDT])

1. Obtain Saudi Aramco Inspection Department approval prior to using any industrial radiography techniques not covered by existing Saudi Aramco requirements.
2. Use engineering controls and PPE to ensure that no individual is exposed to radiation in excess of the prescribed dose limits established by Saudi Aramco requirements.
3. Provide appropriate lighting to the work area when radiographic work is performed at night. Flashlights or other hand-held operated lights are not considered sufficient.
4. Ensure all personnel performing radiography nondestructive testing (NDT) activities and radiographic film interpretation (RTFI) are certified per Saudi Aramco requirements.
5. Use approved radiation dosimeters and monitoring devices when performing NDT activities.

Radiation Source Transport/Storage

1. Do not transport radiation sources in vehicles at speeds exceeding 90 km/h (55 mph).
2. Ensure vehicles transporting radiation sources have the proper equipment per Saudi Aramco requirements.
3. Construct a temporary radioactive source storage facility when sources are used on a daily basis at a job site to minimize transportation risks. Obtain a valid Temporary Radioactive Source Storage Pit Permit for temporary facilities.
4. Maintain a source utilization and tracking log for all on-site storage facilities.

Road Works

Apply the requirements of GI 1021.000 for all excavations and detours for roadways/streets.

1. Obtain approval of the department that has authority over the roadway/street prior to any planned road closure. Circulate a letter of intent 10 days prior to the scheduled road closure detailing the proposed method of construction, traffic control, and plot plan of the proposed construction zone.
2. Ensure the impact of any excavation work/road closure outside Saudi Aramco communities or facilities is communicated to applicable Saudi Arabian Government agencies.
3. Conform to the Ministry of Communications' *Manual on Uniform Traffic Control Devices (MUTCD)* and GI 1021.000 when installing all traffic control barriers, lights, etc., for all road closures or jobs impacting traffic and/or pedestrian flow.
4. Barricade/protect excavations to ensure the safety of pedestrians, especially in community areas.

Traffic Control and Construction Signage

1. Install hazard warning devices prior to the start of any road work, and promptly remove all devices when road work is complete. Ensure surfaces of the roadway are level and in good condition prior to the removal of barricades and markers.
2. Place traffic control and construction signs along the work area, and space the signage accordingly to fit the community or facility street system.
3. Use reflective sheeting for all traffic control and construction signs and maintain them to ensure they are clean and legible.
4. Illuminate road work areas during hours of darkness.

Flagmen

1. Post flagmen at entrance and exit barricades.
2. Provide flagmen with high-visibility (e.g., reflective) vests, reflective "STOP" and "GO" signs or flags, and/or radio communications.
3. Ensure flagmen at the entrance and exit of the construction zone are within sight of each other. If conditions do not permit this (e.g., distance between entrance and exit), post additional flagmen.
4. Protect flagmen with shaded areas, work/rest rotations, water stations, etc., during periods of high heat (see the *Heat Stress* safety topic).

Scaffolding

Apply the following minimum administrative requirements for the safe design, erection, supervision, inspection, use, tagging, alteration, and dismantling of personal access scaffolds. Safety-related technical requirements for personal access scaffolds and scaffolding used for shoring of concrete formwork are provided in applicable Saudi Aramco requirements.

When scaffolds are required, they shall be properly designed, erected, and inspected by certified supervisors/inspectors using the appropriate inspection checklist. Refer to Table 5 for a summary of requirements.

Table 5. Scaffold Review, Erection, and Inspection Requirements.

Design and Review	Special scaffolds or scaffolds taller than 12.2 m (40 ft) require scaffold plans and review by the proponent and the Area Loss Prevention Division.
	Special scaffolds or scaffolds taller than 38 m (125 ft) require additional review by Saudi Aramco Consulting Services Department.
Erection	Scaffolds shorter than 12.2 m (40 ft) shall be erected by a qualified scaffold erector.
	Special scaffolds or scaffolds taller than 12.2 m (40 ft) shall be erected by an approved specialized scaffolding contractor.

Field Inspection and Tagging	Checklist for scaffolds shorter than 6 m (20 ft) shall be completed and tags signed by the certified scaffold supervisor.
	Checklist for special scaffolds and scaffolds taller than 6 m (20 ft) shall be completed and tags signed by the certified scaffold supervisor and scaffold inspector.

1. Prior to scaffold erection, survey the job site and take measures to remove or control potential hazards such as debris, overhead power lines, electrical cables, excavations, etc.
2. Inspect scaffold materials before, during, and after erection to make sure they meet all Saudi Aramco requirements, are in good condition, and are free of defects. Mark any component that does not meet the applicable Saudi Aramco standard with fluorescent orange paint and remove the item from the job site.
3. Erect, alter, and dismantle all scaffolds under the direction of an on-site certified scaffold supervisor.
4. Use PPE, including a personal fall arrest system when erecting or dismantling a scaffold. Ensure that each scaffold craftsman is wearing a full body harness with a shock-absorbing lanyard (see the *Fall Protection* safety topic). Anchor the lanyard to the scaffold only if a stronger anchorage is not available.

Inspection and Tagging

1. Provide a visible scaffold inspection tag (Red, Green, or Yellow) continuously during the entire time the scaffold is being erected, used, or dismantled. The scaffold tag indicates the status of the scaffold (See Figure G).

Figure G. Scaffold Inspection Tags (Red, Green, and Yellow)

2. Use a RED scaffold tag (only allowed by scaffold craftsman) for the purpose of erecting, altering, or dismantling scaffolding.
3. Mark any scaffold that contains platform(s) that physically cannot be completely erected per Saudi Aramco requirements with a signed YELLOW scaffold tag. A YELLOW tag indicates the need for personal fall arrest systems when accessing this scaffold. This does not apply to a scaffold that is missing components required for structural stability (e.g., bearers, runners, posts, or braces).
4. Do not use a scaffold until it has been successfully inspected by the responsible scaffold supervisor and scaffold inspector (for scaffolds over 6 m [20 ft] tall and special scaffolds).
5. Ensure the scaffold is inspected every two weeks.
6. Maintain completed *Scaffold Field Inspection Checklists* on file until the scaffold is dismantled.
7. Do not remove red scaffold tags and use elsewhere prior to dismantling the scaffold they are attached to.
8. Do not reuse GREEN and YELLOW scaffold tags (e.g., do not erase or white out signatures, inspection dates, etc.).

Vehicle Safety

The following safety rules apply to drivers of vehicles supplied by Saudi Aramco and vehicles operated by contractors or others on company premises. Drivers of vehicles are responsible for the safe operation of their vehicles, particularly in relation to speed.

Before You Can Drive

1. Have in your possession a valid Saudi Arabian Government (SAG) driver's license.
2. Immediately report any changes in license status or ability to drive to your supervisor.
3. Complete and pass the Saudi Aramco Driver Improvement Program (DIP) (or approved equivalent). Complete the Driver Improvement Refresher Seminar (DIRS) within the period required.

Preparing to Drive

1. Perform a 360-degree walkaround before getting into the vehicle.
2. Inspect the vehicle's safety equipment (e.g., spare tire, jack, and wrench) before using the vehicle and on a monthly basis.
3. Check vehicle fluids (e.g., radiator coolant, oil, brake fluid) on a monthly basis.
4. Maintain a valid Saudi Aramco inspection sticker (for Saudi Aramco and Contractor vehicles) on the vehicle.
5. Service and repair all motor vehicles according to Saudi Aramco and the manufacturer's maintenance schedule.
6. Report any unsafe conditions or damage to the vehicle immediately.
7. Inspect and maintain tire pressure per the manufacturer's specifications.

While Driving

1. Comply with all applicable laws and traffic requirements.
2. Observe speeds in accordance with posted speed limits and driving conditions.
3. Wear seat belts at all times and ensure that all passengers wear seat belts.
4. Do not use a mobile phone, eat, or drink while driving.
5. Do not operate a vehicle while under the influence of intoxicants or medications that can cause impairment.
6. Do not exceed the vehicle manufacturer's design load capacity when transporting materials. Secure and tie down loads and ensure trailers have operating brakes and taillights.
7. Do not transport passengers in the rear of pickups or on truck beds.
8. Transport only authorized personnel in Saudi Aramco vehicles.
9. Set the parking or emergency brake when the vehicle is parked. Do not leave vehicles unattended while the engine is running.
10. Turn off the engine while refueling vehicles. Do not use portable electrical devices, including mobile phones.
11. Report motor vehicle accidents (MVAs) that occur on company premises or project sites to Saudi Aramco Industrial Security Operations (ISO).
12. Inform your supervisor immediately of an MVA or moving violation after meeting Saudi Aramco ISO and SAG police requirements.
13. Stay at the scene of any incident and only move the vehicle (after a collision) when released or directed to do so by the ISO or SAG police representative.

Remote Area/Off-Road Driving

1. Complete off-road driving training prior to operating a vehicle in a remote area or off-road.
2. Maintain any off-road vehicle in good condition and maintain equipment in the vehicle per Saudi Aramco requirements, including:
    - Compass and/or global positioning system (GPS) unit and appropriate maps.
    - Adequate spare fuel and oil.
    - Communication equipment.
    - Tools and equipment for emergency use (shovel, sand boards, rope, shackles, etc.) and two spare tires.
    - Food and drinking water.
    - Materials to create shade.
3. Inform your direct supervisor of the destination, route, and expected time of return.
4. Stay with the vehicle if lost or stranded in the desert.