- c. Service hoses, e.g., diesel, air, and water are properly stowed.
- d. Warning signs and barriers are posted accordingly.
- 1. Pre-Start Checks:
 - a. Carry out a visual check of the crane to determine its serviceability. This should include the boom, hook blocks, sheaves, wire ropes and pendants (including spooling on drums, rope terminations and any anchorage points), cab and machinery house covers
 - b. Complete the pre-start checklist supplied by the Manufacturer or Owner. This check should include a physical check of all oil levels, coolant level and fuel level.
 - c. Check that all guards over and around moving machinery are in place and secure.
 - d. The Operator's cab windows should be clean and window wipers in good condition.
 - e. All items (personal belongings, clothing, tools drink cups, etc.) in the cab should be stored in such a manner that they would not interfere with Operator controls.
 - f. The crane structures, walkways, etc. should be free from all loose material, tools, etc., which may have the potential to result in falling objects.
 - g. Limit switches and warning devices should be working properly.

8.2 General Operation Requirements

- A. The Crane Operator should not start machine movements until a signalman is within his range of vision or adequate communications have been established.
- B. The Crane Operator should only follow the signals of the designated signalman. However, if anyone should give the emergency "stop!" signal, the Crane Operator should comply.
- C. When extensions are added to the boom, the crane hoisting capacity plate should be changed to clearly indicate the safe load for the boom length and radius being used.
- D. There should be at least five wraps of cable on the drum at all times.
- E. While the crane is in operation, the Operator should not leave the controls. If the Operator must leave the cab at any time, the load should be safely landed, and the prime mover shut down.
- F. Tag lines for controlling loads should be used.
- G. A standard signal system or two-way communication devices should be used on all crane operations. When depending on radio communication, if the communication fails, the crane Operator should stop all movement of the crane and/or load until it can be determined that it is safe to proceed. Reference API RP 2D.
- H. Personnel should not be permitted to work or walk under suspended loads.
- I. The Operator should not pass a load over personnel. A warning signal should be sounded warning personnel to stay clear of the path of a load.
- J. Personnel should not climb, ride or walk on the crane or boom other than for inspection purposes. If necessary, the boom should be lowered to permit safe inspections. When climbing on a boom, fall protection should be utilized.
- K. A personnel transfer device should be used to transport personnel by crane. All personnel transfer devices should be provided with a tail or tag line that is snag resistant and should have a safety lanyard connected between the transfer device and crane hook. (see Section 12.18)

- L. A cargo basket should not be used to transport personnel and a personnel transfer device should not be used as a cargo basket.
- M. During lifts of cargo or personnel, the load should be over water until it reaches the proximity of the boat.
- N. When a workbasket is used, personnel should use personal protective equipment.
- O. All hooks used to lift personnel should be equipped with a self-closing positive locking safety latch. Hooks used to hoist materials should be equipped with a safety latch.
- P. A crane boom should not be moved or handle loads within a close proximity of high voltage lines.
 - 1. In transit with no load and boom lowered, the equipment clearance should be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV.
 - 2. When cranes are handling a load the minimum distance between the power lines and the crane load or any part of the crane should be 10 feet for power lines 50 kV or below. For power lines over 50 kV, the distance should be 10 feet plus 0.4 inch for each 1kV over 50 kV.
- Q. Personnel should not ride on suspended loads.
- R. Each crane should be equipped with an all-purpose ABC class rated fire extinguisher not less than 20lbs.
- S. The Crane Operator should advise his supervisor when unsafe conditions exist.
- T. A preventative maintenance program developed in consideration of the crane manufacturer's recommendations should be established and followed.
- U. Each crane should be equipped with a flashing light that is activated as soon as the crane is started. This device alerts helicopter pilots that the crane is in use.
- V. The Crane Operator should land the load, secure the crane and exit the crane cab. He should stand in plain sight of the pilot when the helicopter approaches the rig.
- W. Anti-two-blocking devices and weight indicators should be in place, in good condition and functioning properly. Limit switches and devices should not be overridden. If there is an absolute need to override a limit switch, review of the process should be undertaken and all personnel involved in the operation moved to a safe area. The Crane Operator must return the override limit switch to operational status once the process is completed.
- X. Crane hand signals should be posted at the crane and other areas where they can be seen by rigging personnel.
- Y. The boom angle indicator should be in place and functioning properly.
- Z. Each crane should be load-tested to manufacturers' specifications and regulatory requirements after any major repairs, changes to boom lengths, or when initially rigged up.
 - AA. Prior to commencing lifting operations, the Crane Operator should take into consideration the prevailing weather conditions, e.g. wind speed/direction, ambient temperature and visibility. Lifting operations should not commence if the weather or environmental conditions could jeopardize the safety of the activity.
 - BB. The Crane Operator should determine the weight of the load prior to the lift.
 - CC. Mobile cranes that utilize outriggers for stability should have all the outriggers extended and properly set on firm ground prior to commencing any lifts.

DD. While using a mobile crane, the Operator should be sure the crane is properly stabilized and secured from inadvertent moving. Wheels should be chocked, brakes are not considered adequate.

8.3 Slings and Shackles

All slings, including those used for pre-slinging, should comply with API RP 2D-current edition or regulatory requirements. The rating of the shackles utilized shall be equal to or greater than the rating of the slings. Each shackle and sling should be individually load stamped and certified. Only shackles and sling hooks that are load rated by their manufacturer, with a rating appropriate for the load, should be used. A system of periodic inspection should be established to assure that any deformation or elongation in the shackles and sling hooks does not exceed the manufacturers' recommendations.

- A. The integrity of slings may be compromised when passed around sharp edges.
- B. Shackles should not be side loaded.
- C. The following chart indicates the tonnage pull on each leg of the sling from 0° to 120°. When using single slings in pairs you must always be aware of the increased loadings in the slings when lifting at an angle. Care should be taken that the safe working load of a sling is not exceeded.



- 1. For the above reason, the SWL of a **pair** of single slings decreases as the angle between them increases.

2. Always consider the variation in sling capacity when slinging in various configurations.



Multiply the SWL of one leg by the mode factor "M" to obtain the SWL of the configuration.

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8.4 Standard Hand Signals for Crane Operations

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Chapter 9 Forklift Operations

9.0 General Operation Requirements

- A. Only trained and authorized operators should be permitted to operate a powered industrial truck commonly referred to as forklift truck. The employer should develop a training program and document the training. Forklift operators should be trained in the type forklift they are to operate.
- B. Forklift operators should know the maximum lifting capacity of the unit they are operating and should not exceed its limits. Lifting capacity of the forklift truck should be marked on the vehicle.
- C. Forklift trucks should be equipped with appropriate safety equipment, such as lights, seat belt, back up alarm, horn, fire extinguisher, and parking brake.
- D. Adjustments or repairs made to forklift trucks should follow manufacturers' recommendations.
- E. When the operator is leaving the forklift, the forks should be lowered flat to the ground, parking brake set, and engine turned off.
- F. The forklift operator should advise his supervisor when unsafe conditions exit.
- G. When a load is moved, it should be lowered to allow as much visibility and stability as possible. If a load blocks forward vision, drive backwards.
- H. The operator should not permit anyone on the forklift truck or lift forks while it is in motion.
- I. Forklift forks should not be used to raise or lower personnel without an approved personnel platform.
- J. Personnel should not place hands or any other parts of their body on or around the hydraulic lift frame of the forklift when it is in operation.
- K. Forklift trucks should be operated at a safe speed.
- L. When not being used, the forklift forks must be stowed in the lowered position.
- M. Each operator should conduct an inspection of the forklift truck to be used. The forklift truck should be inspected at the beginning of each tour or prior to use if not used regularly.
- N. Forklift operators should wear proper PPE. This may include:
 - Gloves and safety boots
 - Hardhats
 - Eye protection
 - Hearing protection
- O. Forklift incidents can be prevented by:
 - Trained maintenance personnel, inspectors and operators.
 - Proper forklift selection for the job.
 - Not hurrying or taking shortcuts.

- Paying attention.
- Being well rested.
- Following safe policies and procedures.
- Check for unsafe conditions such as:
 - Forks or other load-handling attachments cracked or bent.
 - Gouges or large chunks missing from tires.
 - Blind corners.
 - Leaky connectors and hydraulic cylinders.
 - Too much free play in the steering.
 - Improper refueling or recharging practices.
 - Rough or uneven location.

9.1 General Training Requirements

- A. Forklift Operators should have the necessary training to be able to perform their jobs properly. Initial and refresher training should be documented. Training programs should include:
 - The nature of hazards in the work area.
 - How to perform work safely.
 - Rules of powered industrial truck operation and why these rules exist.
 - Loading and unloading, center of gravity, stability, and mechanical limitations.
 - Supervised practice on an operating course that simulates actual conditions.
 - The types of trucks that the Forklift Truck Operator is expected to operate.
 - Oral, written, and operational performance testing.
 - Knowledge of inspection procedures.

Chapter 10 Confined Space Entry Guidelines

10.0 General

A. While the principles of confined space entry are generally universal, local regulatory requirements may impose specific additional responsibilities or may specify standards that differ from those provided here.

Many incidents occur because victims do not fully understand the threat of airborne hazards that they cannot see, smell, or feel. Additional incidents occur when untrained persons enter unknown atmospheres to rescue fallen co-workers. Common causes of confined space related incidents are:

- 1. Unsafe Acts and Omissions
 - a. Failure to test the atmosphere in a confined space before entry.
 - b. Failure to continuously monitor the atmosphere in a permit-required confined space.
 - c. Failure to lock out hazardous fluids, mechanical equipment, and electrical power to equipment inside the confined space.
 - d. Failure to follow approved entry procedures.
 - e. Failure to preplan rescue and retrieval efforts.
 - f. Failure to use adequate respirators.
- 2. Unsafe Conditions
 - a. Lack of training.
 - b. Fall hazards.
 - c. Oxygen deficient atmosphere.
 - d. Oxygen enriched atmosphere.
 - e. Poor or improper lighting
 - f. Flammable atmosphere.
 - g. Lack of a communication system when entrants are out of sight.
 - h. Toxic atmosphere.
 - i. Electrical shock hazards.
 - j. Presence of an engulfing or drowning medium.
 - k. Entrapping mechanisms.

I. Grinding, crushing, or mixing mechanisms.

m. Contact with hazardous chemicals.

- B. Key Elements of a Confined Space Written Program may include:
 - 1. Identification of confined spaces.

All confined spaces should be identified and classified as non-permit-required confined spaces or permitrequired confined spaces. The degree of hazards that confront entrants determines the classification of the confined space. A hazard assessment should be performed and documented. Permit-required confined spaces should be posted.

- 2. Establishment and full implementation of a written entry permit system.
- 3. Air monitoring.
- 4. Selection and training of key personnel.
- 5. Protective equipment.
- 6. Rescue procedures and provisions for attendants and emergency response.
- Personnel selection, training, and motivation are the three most important aspects of a confined-space safe entry program. This program should be established through oversight by health and safety professionals and support by management.
- 8. Safe entry procedures must be developed for permit-required spaces before personnel are allowed to enter these spaces. It is important to include any emergency that could occur in the confined space in the safe entry procedure emergency response and rescue procedures. The maximum number of authorized entrants should be kept to a minimum. This number should be spelled out in the confined-space safe entry procedure required to obtain the permit. The duration of the permit should not exceed the time required to complete the assigned task or job. Confined Space Entry Permits should expire at the end of the work shift of the personnel involved in the task. When a third party is conducting the work in the confined space and the rig crew members assisting are being relieved, the confined space operation should stop and a new permit be issued. All lockout/tagout provisions, as well as preparations for entry and emergency response, need to be rechecked. All safeguards in the approved procedure should be in place before the second crew enters the confined space.
- 9. A lockout/tagout program is essential to safeguard personnel during confined-space entry operations. Locking devices should be secure enough so that they are not accidentally removed. Devices used to block or restrain stored mechanical energy sources must be engineered to do so safely. Lines and pipes that could carry flammable, toxic, or injurious substances into the confined space must be blocked by positive means, such as valves, so that the atmosphere in the confined space is not contaminated or rendered inert.
- 10. Key Personnel Roles
 - a. Supervisor: The supervisor has overall responsibility for the safety of all persons involved with entry operations into confined spaces under his or her control. This includes authorized entrants, safety attendants, and emergency rescue personnel. The supervisor authorizes entry into a confined space, approves procedures for entry, and coordinates efforts of all other key personnel. The supervisor is responsible to see that all safety requirements identified in the permit are met, all required equipment is readily available, and all persons involved in the entry are fully aware of their roles and responsibilities. The supervisor's responsibilities also include closing out the permit when the entry is complete and retaining the permit for one year for audit purposes.

- b. Designated Safety Attendant: The Safety Attendant continuously observes authorized entrants working in a confined space. The Safety Attendant should be trained to recognize early symptoms of oxygen depletion (anoxia), toxic effects, and behavioral changes. The attendant should not be exposed to the same hazard, as the entrants should be trained, equipped, and physically able to assist the Confined Space Rescue team. He or she will keep track of the number of people entering and leaving the confined space to avoid exposing rescue personnel to grave risks by searching for a person who has previously left the confined space. Where entrants are out of sight of the safety attendant, a means of communications must be provided.
- c. **Authorized Entrant:** An authorized entrant is a worker who is trained to safely enter, work in, and exit confined spaces. Training should include classroom training, on-the-job training in self-help techniques, and an examination. The Authorized Entrant should be physically fit to be able to wear a SCBA and conduct work in confined space.
- d. Entry Supervisor: The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation. The entry supervisor reviews and approves procedures to satisfy confined-space entry permit requirements. Entry supervisor also defines the types of respiratory protection needed in the confined space and samples air to determine that oxygen content is neither deficient nor enriched and that the atmosphere is nonflammable, non-explosive, and nontoxic. The entry supervisor or a safety engineer inspects the confined space to determine if there are physical, engulfment, electrical, fall, or fire hazards that could injure entrants. He or she takes steps to prevent movement of machinery because of gravity, springs, or trapped compressed gases and reviews and approves procedures for entry, emergency response plans, and preparations for the confined-space entry.
- e. **Rescue Team:** Rescue Team members should be trained and physically fit to be able to carry out rescue operations while wearing a SCBA. Training should include classroom training, on-the-job training in rescue techniques, and an examination.
- 11. Confined-space entry permit programs should be evaluated annually so that personnel, procedures, and equipment components of the program are maintained in a high state of readiness. Confined-space entry permits should be retained for one year after each job completion in a central location. A feedback system should be implemented to address problems encountered during confined-space entry.

10.1 Scope and Application

This program establishes recommended procedures for classifying, preparing and entry of confined spaces. This program applies to any confined space:

- A. That has limited openings for entry and/or exit.
- B. That could contain known or potential hazards.
- C. That is not intended for continuous occupation.
- D. That has insufficient natural ventilation.

10.2 Definitions

- A. Confined Space means a space that:
 - 1. Is large enough and so configured that an employee can bodily enter and perform assigned work; and

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- 2. Has limited or restricted means for entry or exit; and
- 3. Is not designed for continuous employee occupancy.
- B. <u>Non-Permit Confined Space</u> means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious harm.
- C. <u>Permit-Required Confined Space</u> means a confined space that has one or more of the following characteristics:
 - 1. Contains or has the potential to contain a hazardous atmosphere; or
 - 2. Contains a material that has the potential for engulfing an entrant; or
 - 3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
 - 4. Contains any recognized serious safety or health hazard.

Note: A Permit-Required Confined Space may be reclassified as a non-permit confined space by removing the hazard before entry.

- D. <u>Acceptable Entry Conditions</u> means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a Permit-Required Confined Space entry can safely enter into and work within the space.
- E. <u>Designated Safety Attendant</u> means an individual stationed outside the permit space who monitors the authorized entrants and who performs all attendants' duties assigned by the Confined Space Entry Program.
- F. <u>Authorized Entrant</u> means an employee who is authorized by the employer to enter a permit space.
- G. <u>Blanking</u> or <u>Blinding</u> means the absolute closure of a pipe, line, or duct by the fastening of a solid plate that completely covers the bore and is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate. Attempts should be made to blind at the closest point to the confined space.
- H. <u>Double Block and Bleed</u> means the closure of a line or pipe by closing and locking, or tagging, two (2) in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.
- I. <u>Entry</u> means the action by which a person passes through an opening into a Permit-Required Confined Space. Entry occurs as soon as any part of the entrant's body breaks the plane of an opening into the space.
- J. <u>Entry Permit</u> means the written or printed document that is provided by the employer to allow and control entry into a permit space. Acceptable entry conditions are properly noted on this document.
- K. <u>Entry Supervisor</u> means the person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required.
- L. <u>Hazardous Atmosphere</u> means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of the ability to self-rescue, injury, or acute illness from one or more of the following causes:
 - 1. Atmosphere oxygen concentration below 19.5 percent or above 23.5 percent.
 - 2. Flammable gas, vapor or mist in excess of 10 percent of the lower flammable limits (LFL).
 - 3. Airborne combustible dusts at a concentration that meets or exceeds lower explosion limits (LEL).