CONSTRUCTION CRANES

SUBPART A - PURPOSE

Many types of cranes, hoists, and rigging devices are used at Berry Bros. General Contractors, Inc. for lifting and moving materials. Berry Bros.' policy is to maintain a safe workplace for its employees; therefore, it cannot be overemphasized that only qualified and licensed individuals shall operate these devices. The safety rules and guidance in this program apply to all operations at Berry Bros. that involve the use of cranes and lifting devices installed in or attached to buildings and to all Berry Bros. employees, supplemental labor, and subcontractor personnel who use such devices.

SUBPART B - SCOPE

The standard applies to power-operated equipment, when used in construction that can hoist, lower and horizontally move a suspended load. Such equipment includes, but is not limited to: articulating cranes (such as knuckle-boom cranes); crawler cranes; floating cranes; cranes on barges; locomotive cranes; mobile cranes (such as

wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted, and boom truck cranes); multi-purpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load; industrial cranes (such as carry-deck cranes); dedicated pile drivers; service/ mechanic trucks with a hoisting device; a crane on a monorail; tower cranes (such as a fixed jib, i.e., "hammerhead boom"), luffing boom and self-erecting); pedestal cranes; portal cranes; overhead and gantry cranes; straddle cranes; side boom cranes; derricks; and variations of such equipment.

In addition, the standard applies to the above mentioned equipment when used with certain attachments; whether the attachments are crane-attached or suspended and include, but are not limited to: hooks, magnets, grapples, clamshell buckets, orange peel buckets, concrete buckets, draglines, personnel platforms, augers or drills and pile driving equipment.

There are certain exclusions which can be found under CFR 1926.1400 exclusions.

SUBPART C - DEFINITIONS 1926.1401

A/D director (Assembly/Disassembly director) means an individual who meets this subpart's requirements for an A/D director, irrespective of the person's formal job title or whether the person is non-management or management personnel.

Articulating crane means a crane whose boom consists of a series of folding, pin connected structural members, typically manipulated to extend or retract by power from hydraulic cylinders.

Assembly/Disassembly means the assembly and/or disassembly of equipment covered under this standard. With regard to tower cranes, "erecting and climbing" replaces the term "assembly," and "dismantling" replaces the term "disassembly." Regardless of whether the crane is initially erected to its full height or is climbed in stages, the process of increasing the height of the crane is an erection process.

Assist crane means a crane used to assist in assembling or disassembling a crane.

CONSTRUCTION CRANES

Attachments mean any device that expands the range of tasks that can be done by the equipment. Examples include, but are not limited to: an auger, drill, magnet, pile-driver, and boom-attached personnel platform.

Audible signal means a signal made by a distinct sound or series of sounds. Examples include, but are not limited to, sounds made by a bell, horn, or whistle.

Blocking (also referred to as "cribbing") is wood or other material used to support equipment or a component and distribute loads to the ground. It is typically used to support lattice boom sections during assembly/ disassembly and under outrigger and stabilizer fl oats.

Boatswain's chair means a single-point adjustable suspension scaffold consisting of a seat or sling (which may be incorporated into a full body harness) designed to support one employee in a sitting position.

Bogie means "travel bogie," which is defined below.

Boom (equipment other than tower crane) means an inclined spar, strut, or other long structural member which supports the upper hoisting tackle on a crane or derrick. Typically, the length and vertical angle of the boom can be varied to achieve increased height or height and reach when lifting loads. Booms can usually be grouped into general categories of hydraulically extendible, cantilevered type, latticed section, cable supported type or articulating type.

Boom (tower cranes)*:* On tower cranes, if the "boom" (i.e., principal horizontal structure) is fixed, it is referred to as a jib; if it is moveable up and down; it is referred to as a boom.
Boom angle indicator means a device which measures the angle of the boom relative to horizontal.

Boom hoist limiting device includes boom hoist disengaging device, boom hoist shutoff, boom hoist disconnect, boom hoist hydraulic relief, boom hoist kick-outs, automatic boom stop device, or derricking limiter. This type of device disengages boom hoist power when the boom reaches a predetermined operating angle. It also sets brakes or closes valves to prevent the boom from lowering after power is disengaged.

CONSTRUCTION CRANES

Boom length indicator indicates the length of the permanent part of the boom (such as ruled markings on the boom) or, as in some computerized systems, the length of the boom with extensions/attachments.

Boom stop includes boom stops, (belly straps with struts/standoff), telescoping boom stops, attachment boom stops, and backstops. These devices restrict the boom from moving above a certain maximum angle and toppling over backward.

Boom suspension system means a system of pendants, running ropes, sheaves, and other hardware which supports the boom tip and controls the boom angle.
Builder means the builder/constructor of equipment.

Center of gravity*:* The center of gravity of any object is the point in the object around which its weight is evenly distributed. If you could put a support under that point, you could balance the object on the support.

Certified welder means a welder who meets nationally recognized certification requirements applicable to the task being performed.

Climbing means the process in which a tower crane is raised to a new working height, either by adding additional tower sections to the top of the crane (top climbing), or by a system in which the entire crane is raised inside the structure (inside climbing).

Come-a-long means a mechanical device typically consisting of a chain or cable attached at each end that is used to facilitate movement of materials through leverage.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Controlled load lowering means lowering a load by means of a mechanical hoist drum device that allows a hoisted load to be lowered with maximum control using the gear train or hydraulic components of the hoist mechanism. Controlled load lowering requires the use of the hoist drive motor, rather than the load hoist brake, to lower the load.

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Controlling entity means an employer that is a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project – its planning, quality and completion.

Counterweight means a weight used to supplement the weight of equipment in providing stability for lifting loads by counterbalancing those loads.

Crane/derrick includes all equipment covered by this subpart.

Crawler crane means equipment that has a type of base mounting which incorporates a continuous belt of sprocket driven track.

Crossover points means locations on a wire rope which is spooled on a drum where one layer of rope climbs up on and crosses over the previous layer. This takes place at each flange of the drum as the rope is spooled onto the drum, reaches the flange, and begins to wrap back in the opposite direction.

Dedicated channel means a line of communication assigned by the employer who controls the communication system to only one signal person and crane/derrick or to a coordinated group of cranes/derricks/signal person(s).

Dedicated pile-driver is a machine that is designed to function exclusively as a pile driver. These machines typically have the ability to both hoist the material that will be pile-driven and to pile-drive that material.

Dedicated spotter (power lines)*:* To be considered a dedicated spotter, the requirements of § 1926.1428 (Signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and: the equipment, load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

Directly under the load means a part or all of an employee is directly beneath the load.

Dismantling includes partial dismantling (such as dismantling to shorten a boom or substitute a different component).

CONSTRUCTION CRANES

Drum rotation indicator means a device on a crane or hoist which indicates in which direction and at what relative speed a particular hoist drum is turning.

Electrical contact occurs when a person, object, or equipment makes contact or comes in close proximity with an energized conductor or equipment that allows the passage of current.

Employer-made equipment means floating cranes/derricks designed and built by an employer for the employer's own use.

Encroachment is where any part of the crane, load line or load (including rigging and lifting accessories) breaches a minimum clearance distance that this subpart requires to be maintained from a power line.

Equipment means equipment covered by this subpart.

Equipment criteria mean instructions, recommendations, limitations and specifications.

Fall protection equipment means guardrail systems, safety net systems, and personal fall arrest systems, positioning device systems or fall restraint systems.

Fall restraint system means a fall protection system that prevents the user from falling any distance. The system is comprised of either a body belt or body harness, along with an anchorage, connectors and other necessary equipment. The other components typically include a lanyard, and may also include a lifeline and other devices.

Fall zone means the area (including but not limited to the area directly beneath the load) in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident.

Flange points are points of contact between the ropes and drum flange where the rope changes layers.

Floating *cranes/derricks* means equipment designed by the manufacturer (or employer) for marine use by permanent attachment to a barge, pontoons, vessel or other means of flotation.

Free fall (of the load line) means that only the brake is used to regulate the descent of the load line (the drive mechanism is not used to drive the load down faster or retard its lowering).

Free surface effect is the uncontrolled transverse movement of liquids in compartments which reduce a vessel's transverse stability.

Hoist means a mechanical device for lifting and lowering loads by winding a line onto or off a drum.
Hoisting is the act of raising, lowering or otherwise moving a load in the air with equipment covered by this standard. As used in this standard, "hoisting" can be done by means other than wire rope/ hoist drum equipment.

Insulating link/device means an insulating device listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with 29 CFR 1910.7.
Jib stop (also referred to as a jib backstop) is the same type of device as a boom stop but is for a fixed or luffing jib.

Land crane/derrick is equipment not originally designed by the manufacturer for marine use by permanent attachment to barges, pontoons, vessels, or other means of floatation.

List means the angle of inclination about the longitudinal axis of a barge, pontoons, vessel or other means of floatation.

Load refers to the object(s) being hoisted and/or the weight of the object(s); both uses refer to the object(s) and the load-attaching equipment, such as, the load block, ropes, slings, shackles, and any other ancillary attachment.

Load moment (or rated capacity) indicator means a system which aids the equipment operator by sensing (directly or indirectly) the overturning moment on the equipment, i.e., load multiplied by radius. It compares this lifting condition to the equipment's rated capacity, and indicates to the operator the percentage of capacity at which the equipment is working. Lights, bells, or buzzers may be incorporated as a warning of an approaching overload condition.

Load moment (or rated capacity) limiter means a system which aids the equipment operator by sensing (directly or indirectly) the overturning moment on the equipment, i.e., load multiplied by radius. It compares this lifting condition to the equipment's rated

capacity, and when the rated capacity is reached, it shuts off power to those equipment functions which can increase the severity of loading on the equipment, e.g., hoisting, telescoping out, or luffing out. Typically, those functions which decrease the severity of loading on the equipment remain operational, e.g., lowering, telescoping in, or luffing in.

Locomotive crane means a crane mounted on a base or car equipped for travel on a railroad track.

Luffing jib limiting device is similar to a boom hoist limiting device, except that it limits the movement of the luffing jib.

Marine hoisted personnel transfer device means a device, such as a "transfer net," that is designed to protect the employees being hoisted during a marine transfer and to facilitate rapid entry into and exit from the device. Such devices do not include boatswain's chairs when hoisted by equipment covered by this standard.

Marine work site means a construction work site located in, on or above the water.

Mobile crane means a lifting device incorporating a cable suspended latticed boom or hydraulic telescopic boom designed to be moved between operating locations by transport over the road.

Moving point-to-point means the times during which an employee is in the process of going to or from a work station.

Multi-purpose machine means a machine that is designed to be configured in various ways, at least one of which allows it to hoist (by means of a winch or hook) and horizontally move a suspended load. For example, a machine that can rotate and can be configured with removable forks/tongs (for use as a forklift) or with a winch pack, jib (with a hook at the end) or jib used in conjunction with a winch. When configured with the forks/tongs, it is not covered by this subpart. When configured with a winch pack, jib (with a hook at the end) or jib used in conjunction with a winch, it is covered by this subpart.

Nationally recognized accrediting agency is an organization that, due to its independence and expertise, is widely recognized as competent to accredit testing organizations. Examples of such accrediting agencies include, but are not limited to,

the National Commission for Certifying Agencies and the American National Standards Institute.

Nonconductive means that, because of the nature and condition of the materials used, and the conditions of use (including environmental conditions and condition of the material), the object in question has the property of not becoming energized (that is, it has high dielectric properties offering a high resistance to the passage of current under the conditions of use).

Operational aids are devices that assist the operator in the safe operation of the crane by providing information or automatically taking control of a crane function. These include, but are not limited to, the devices listed in § 1926.1416 ("listed operational aids").

Operational controls means levers, switches, pedals and other devices for controlling equipment operation.

Operator means a person who is operating the equipment.

Overhead and gantry cranes includes overhead/bridge cranes, semi-gantry, cantilever gantry, wall cranes, storage bridge cranes, launching gantry cranes, and similar equipment, irrespective of whether it travels on tracks, wheels, or other means.

Pendants includes both wire and bar types. Wire type: a fixed length of wire rope with mechanical fittings at both ends for pinning segments of wire rope together. Bar type: instead of wire rope, a bar is used. Pendants are typically used in a latticed boom crane system to easily change the length of the boom suspension system without completely changing the rope on the drum when the boom length is increased or decreased.

Personal fall arrest system means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

Portal crane is a type of crane consisting of a rotating upper structure, hoist machinery, and boom mounted on top of a structural gantry which may be fixed in one location or have travel capability. The gantry legs or columns usually have portal openings in between to allow passage of traffic beneath the gantry.

Power lines means electric transmission and distribution lines.

Procedures **i**nclude, but are not limited to: instructions, diagrams, recommendations, warnings, specifications, protocols and limitations.

Proximity alarm is a device that provides a warning of proximity to a power line and that has been listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with 29 CFR 1910.7.

Qualified evaluator (not a third party) means a person employed by the signal person's employer who has demonstrated that he/she is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

Qualified evaluator (third party) means an entity that, due to its independence and expertise, has demonstrated that it is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

Qualified person means a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.

Qualified rigger is a rigger who meets the criteria for a qualified person.

Range control limit device is a device that can be set by an equipment operator to limit movement of the boom or jib tip to a plane or multiple planes.
Range control warning device is a device that can be set by an equipment operator to warn that the boom or jib tip is at a plane or multiple planes.

Rated capacity means the maximum working load permitted by the manufacturer under specified working conditions. Such working conditions typically include a specific combination of factors such as equipment configuration, radii, boom length, and other parameters of use.

Rated capacity indicator *See* load moment indicator.

Rated capacity limiter: See load moment limiter.

Repetitive pickup points refer to, when operating on a short cycle operation, the rope being used on a single layer and being spooled repetitively over a short portion of the drum.

Running *wire rope* means a wire rope that moves over sheaves or drums.

Runway means a firm, level surface designed, prepared and designated as a path of travel for the weight and configuration of the crane being used to lift and travel with the crane suspended platform. An existing surface may be used as long as it meets these criteria.

Side boom crane means a track-type or wheel-type tractor having a boom mounted on the side of the tractor, used for lifting, lowering or transporting a load suspended on the load hook. The boom or hook can be lifted or lowered in a vertical direction only.

Special hazard warnings mean warnings of site-specific hazards (for example, proximity of power lines).

Stability (flotation device) means the tendency of a barge, pontoons, vessel or other means of flotation to return to an upright position after having been inclined by an external force.

Standard Method means the protocol in Appendix A of this subpart for hand signals.

Superstructure: See Upper works.

Tagline means a rope (usually fiber) attached to a lifted load for purposes of controlling load spinning and pendulum motions or used to stabilize a bucket or magnet during material handling operations.

Tender means an individual responsible for monitoring and communicating with a diver.

Tilt up or tilt down operation means raising/lowering a load from the horizontal to vertical or vertical to horizontal.

Tower crane is a type of lifting structure which utilizes a vertical mast or tower to support a working boom (jib) in an elevated position. Loads are suspended from the

working boom. While the working boom may be of the fixed type (horizontal or angled) or have luffing capability, it can always rotate to swing loads, either by rotating on the top of the tower (top slewing) or by the rotation of the tower (bottom slewing). The tower base may be fixed in one location or ballasted and moveable between locations. Mobile cranes that are configured with luffing jib and/or tower attachments are not considered tower cranes under this section.

Travel bogie (tower cranes) is an assembly of two or more axles arranged to permit vertical wheel displacement and equalize the loading on the wheels.

Trim means angle of inclination about the transverse axis of a barge, pontoons, vessel or other means of floatation.

Two blocking means a condition in which a component that is uppermost on the hoist line such as the load block, hook block, overhaul ball, or similar component, comes in contact with the boom tip, fixed upper block or similar component. This binds the system and continued application of power can cause failure of the hoist rope or other component.

Unavailable procedures mean procedures that are no longer available from the manufacturer, or have never been available, from the manufacturer.

Upper works means the revolving frame of equipment on which the operating machinery (and many cases the engine) are mounted along with the operator's cab. The counterweight is typically supported on the rear of the upper structure and the boom or other front end attachment is mounted on the front.

Wire rope means a flexible rope constructed by laying steel wires into various patterns of multi-wired strands around a core system to produce a helically wound rope.

SUBPART D - GROUND CONDITIONS 1926.1402

Definitions

- "Ground conditions" means the ability of the ground to support the equipment (including slope, compaction, and firmness).
- "Supporting materials" means blocking, mats, cribbing, marsh buggies (in marshes/ wetlands), or similar supporting materials or devices.

The equipment must not be assembled or operated unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.

The controlling entity must:

- Ensure that ground preparations necessary to meet the requirements of this section are provided.
- Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.

If there is no controlling entity for the project, the requirement must be met by the employer that has authority at the site to make or arrange for ground preparations.

If the A/D director or the operator determines that ground conditions do not meet the requirements, that person's employer must have a discussion with the controlling entity regarding the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), the requirements can be met.

This section does not apply to cranes designed for use on railroad tracks when used on railroad tracks that are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR part 213 and that comply with applicable Federal Railroad Administration requirements.

SUBPART E - ASSEMBLY/DISASSEMBLY 1926.1403

When assembling or disassembling equipment (or attachments), the employer must comply with all applicable manufacturer prohibitions and must comply with either:

- Manufacturer procedures applicable to assembly and disassembly.
- Employer procedures for assembly and disassembly. Employer procedures may be used only where the employer can demonstrate that the procedures used meet the requirements in CFR 1926.1406. NOTE: The employer must follow manufacturer procedures when an employer uses synthetic slings during assembly or disassembly rigging. (See CFR 1926.1404(r).)

General Requirements

(a) *Supervision* – competent-qualified person.

- Assembly/disassembly must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons ("A/D director").
- Where the assembly/disassembly is being performed by only one person, that person must meet the criteria for both a competent person and a qualified person. For purposes of this standard, that person is considered the A/D director.
- The A/D Director shall be responsible for addressing the specific hazards associated with assembly/disassembly operations such as:
  - Site and ground bearing conditions
  - Blocking material
  - Proper location of blocking
  - Verifying assist crane loads
  - Boom and jib pick points
  - Center of gravity
  - Stability upon pin removal
  - Snagging
  - Struck by counterweights
  - Boom hoist brake failure
  - Loss of backward stability
  - Wind speed and weather
- *Capacity limits*. During all phases of assembly/disassembly, rated capacity limits for loads imposed on the equipment, equipment components (including rigging), lifting lugs and

equipment accessories, must not be exceeded for the equipment being assembled/disassembled.

(b) *Knowledge of procedures.* The A/D director must understand the applicable assembly/disassembly procedures.

(c) *Review of procedures.* The A/D director must review the applicable assembly/disassembly procedures immediately prior to the commencement of assembly/disassembly unless the A/D director understands the procedures and has applied them to the same type and configuration of equipment (including accessories, if any).

(d) *Crew instructions.*

(1) Before commencing assembly/disassembly operations, the A/D director must ensure that the crew members understand all of the following:
(i) Their tasks.
(ii) The hazards associated with their tasks.
(iii) The hazardous positions/locations that they need to avoid.

(2) During assembly/disassembly operations, before a crew member takes on a different task, or when adding new personnel during the operations, the requirements in paragraphs (d) (1) (i) through (d) (1) (iii) of this section must be met.

Employer Procedures 1926.1406

(a) When using employer procedures instead of manufacturer procedures for assembly/disassembly, the employer must ensure that the procedures:

(1) Prevent unintended dangerous movement, and prevent collapse, of any part of the equipment.

(2) Provide adequate support and stability of all parts of the equipment.

(3)Position employees involved in the assembly/disassembly operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized.

(b) *Qualified person.* Employer procedures must be developed by a qualified person.

SUBPART F - RESPONSIBILITIES

Managers and Superintendents Responsibilities

- Ensuring that all operators are trained in safe work standards including the use of fire extinguishers.
- Ensuring that employees under their supervision receive the required training and are certified and licensed to operate the cranes and hoists in their areas.
- Providing training for prospective Crane and Hoist Operators. At Berry Bros., all Crane and Hoist Operators shall be trained and certified at a qualified third-party training facility. This applies also to Re-Training and Re-Certification.
- Evaluating crane and hoist trainees using the Crane Safety Checklist and submitting the Qualification Request Form to the Safety Office to obtain the operator's license. Critical items such as brakes, crane hooks, and cables are included in the inspections.
- Ensuring that hoisting equipment (brakes, hooks, ropes etc.) is inspected and tested monthly by a responsible individual and that rigging equipment is inspected annually, and kept on file with a date and signature of inspector.
- Ensuring that a substantial and durable load and operating chart with clearly legible letters & figures shall be provided with each crane and securely fixed to the crane cab in a location easily visible to the operator while seated at his control station.

Crane and Hoist Operators Responsibilities

- Operating hoisting equipment safely.
- All cables (ropes) must be thoroughly inspected before crane is used. A record of the date of inspection, ID of the rope inspected, and signature of person performing inspection must be documented.
- All cables (rope) which has been idle for a period of a month or more due to a shut down or storage of a crane on which it is installed shall be given a

thorough inspection before it is used. A record of the date of inspection, ID of the rope inspected, and signature of person performing inspection must be documented.

- Conducting functional tests prior to using the equipment.
- Selecting and using rigging equipment appropriately.
- Having a valid operator's license on their person while operating cranes or hoists.
- Participating in the medical certification program, as required.
- Maintaining written reports on rated load tests showing the test procedures and confirming the adequacy of any repairs or alterations.
- Never exceed the rated load.
- It is the operators responsibility to perform daily inspections of the crane to assure no adverse health or environmental hazards exists that could be harmful to the operator or any other employee and the environment. (Fuel, fume, oil leaks).

Maintenance/Operations Departments Responsibilities

- Performing annual maintenance and inspection of all Berry Bros. cranes and hoists that are not covered by a program with maintenance responsibility.
- Conducting periodic and special load tests of cranes and hoists.
- Maintaining written records of inspections and tests, and providing copies of all inspections and test results to facility managers and building coordinators who have cranes and hoists on file.
- Inspecting and load testing cranes and hoists following modification or extensive repairs (e.g., a replaced cable or hook, or structural modification.)
- Scheduling a non-destructive test and inspection for crane and hoist hooks at the time of the periodic load test, and testing and inspecting before use new replacement hooks and other hooks suspected of having been overloaded. The evaluation, inspection, and testing may include, but are not limited to visual, penetrate dye, and magnetic particle techniques referenced in ASME B30.10 (Hooks, Inspection and Testing.)
- Maintaining all manuals for cranes and hoists in a central file for reference.
- Providing a CO_2 or dry chemical fire extinguisher in the cab of the crane, as well as understanding how to properly operate and store this type of extinguisher.

HS&E Department and Maintenance Departments Responsibilities

- Conducting training for all Crane & Hoist Operators at an awareness level by in-house training. All certification training will be done via third-party and will be arranged by the HS&E Dept.
- Issuing licenses to Crane and Hoist Operators via certified third-party certified training facility. Arranged via (HSE Dept.)
- Periodically verifying monthly test and inspection reports. (Maintenance Department)
- Interpreting crane and hoist safety rules and standards. (HSE/Maintenance)

SUBPART G - TRAINING 1926.1408

The employer must train each operator and crew member assigned to work with the equipment on all of the following:

(i) The procedures to be followed in the event of electrical contact with a power line. Such training must include:

- Information regarding the danger of electrocution from the operator simultaneously touching the equipment and the ground.
- Operating and maintenance personnel are familiar with the use and care of provided fire extinguishers.
- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The danger of the potentially energized zone around the equipment (step potential).
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- Safe clearance distance from power lines.

(ii) Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and continue to be de-energized and visibly grounded at the work site.

(iii) Power lines are presumed to be un-insulated unless the utility owner/operator or a registered engineer who is a qualified person with respect to electrical power transmission and distribution confirms that a line is insulated.

(iv) The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.

(v) The procedures to be followed to properly ground equipment and the limitations of grounding.

(2) Employees working as dedicated spotters must be trained to enable them to effectively perform their task, including training on the applicable requirements of this section.

(3) Training under this section must be administered in accordance with CFR 1926.1430(g).

Table A - Minimum Clearance Distances

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1,000	45
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200 kV.

SUBPART H - POWER LINE SAFETY 1926.1407

Before assembling or disassembling equipment, the employer must determine if any part of the equipment, load line, or load (including rigging and lifting accessories) could get, in the direction or area of assembly/disassembly, closer than 20 feet to a power

line during the assembly/disassembly process. If so, the employer must meet the requirements:

- De-energize and ground
- 20 foot clearance
- Determine the line's voltage and the minimum clearance distance permitted

Before beginning equipment operations, the employer must conduct Hazard Assessments and take the necessary precautions inside the work zone. The work zone shall be identified by demarcating boundaries such as flag and range limiting devices or defining the work zone as 360 degrees around the equipment up to the maximum working radius. The hazard assessment must determine if any part of the equipment could get closer than 20 feet to the power line.

If it is determined that any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line then at least one of the following measures must be taken:

- Ensure the power lines have been de-energized and visibly grounded.
- Ensure that no part of the equipment, load line, or load gets closer than 20 feet to the power line.
- Determine the lines voltage and minimum approach distance permitted by table A.

POWER LINE SAFETY (OVER 350 kV) 1926.1409

The requirements of CFR 1926.1407 and CFR 1926.1408 apply to power lines over 350 kV except:

(a) For power lines at or below 1000 kV, wherever the distance "20 feet" is specified, the distance "50 feet" must be substituted.

(b) For power lines over 1000 kV, the minimum clearance distance must be established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.

POWER LINE SAFETY (All Voltages) 1926.1410

CONSTRUCTION CRANES

Equipment operations in which any part of the equipment, load line, or load (including rigging and lifting accessories) is closer than the minimum approach distance under Table A of CFR 1926.1408 to an energized power line is prohibited, except where the employer determines:

(a) That it is infeasible to do the work without breaching the minimum approach distance under Table A of CFR 1926.1408.

(b) That after consultation with the utility owner/operator, it is infeasible to de-energize and ground or relocate the power line.

(c) *Minimum clearance distance.*

(1) The power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution determines the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions. The factors that must be considered in making this determination include, but are not limited to: conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line, and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.

(2) Paragraph (c)(1) of this section does not apply to work covered by subpart V of this part; instead, for such work, the minimum clearance distances specified in CFR 1926.950 Table V-1 apply. Employers engaged in subpart V work are permitted to work closer than the distances in CFR 1926.950 Table V-1 where both the requirements of this section and CFR 1926.952(c)(3)(i) or (ii) are met.

(d) A planning meeting with the employer and utility owner/operator (or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution) is held to determine the procedures that will be followed to prevent electrical contact and electrocution.

(1) If the power line is equipped with a device that automatically re-energizes the circuit in the event of a power line contact, before the

work begins, the automatic reclosing feature of the circuit interrupting device must be made inoperative if the design of the device permits.

(2) A dedicated spotter who is in continuous contact with the operator. The spotter must:

- **a.** Equipped with a visual aid to assist in identifying the minimum clearance distance.
- **b.** Be positioned to effectively gauge the clearance distance.
- **c.** Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.
- **d.** Give timely information to the operator so that the required clearance distance can be maintained.

(3) An elevated warning line or barricade in view of the operator equipped with flags or similar high-visibility markings, to prevent electrical contact. However, this provision does not apply to work covered by subpart V of this part.

(4) Insulating link / device

(5) Non-conductive rigging if the rigging may be within the Table A CFR 1926.1408 distance during operation.

(6) If the equipment is equipped with a device that automatically limits range of movement, it must be used and set to prevent any part of the equipment, load line, or load (including rigging and lifting accessories) from breaching the minimum approach distance established under paragraph (c) of this section.

(7) If a tag line is used, it must be of non-conductive type.

(8) Barricades forming a perimeter at least 10 feet away from the equipment to prevent unauthorized personnel from entering the work area. In areas where the barricades cannot be 10 feet away they must be as far from the equipment as feasible.

(9) Workers other the operator must be prohibited from touching the load line above the insulating ling/ device and crane.

(10) Only personnel essential to the operations are permitted to be in the area of the crane and load.

(11) The equipment must be properly grounded.

(12) Insulating line hose or cover-up must be installed by the utility owner/operator except where such devices are unavailable for the line voltage involved.

(e) The procedures developed to comply with the information in paragraph (d) of this section are documented and immediately available on-site.

(f) The equipment user and utility owner/operator (or registered professional engineer) will meet with the equipment operator and the other workers who will be in the area of the equipment or load to review the procedures that will be implemented to prevent breaching the minimum approach distance established in paragraph (c) of this section and prevent electrocution.

(g) The procedures developed to comply with paragraph (d) of this section are implemented.

(h) The utility owner/operator (or registered professional engineer) and all employers of employees involved in the work must identify one person who will direct the implementation of the procedures. The person identified in accordance with this paragraph must direct the implementation of the procedures and must have the authority to stop work at any time to ensure safety.

(i) If a problem occurs implementing the procedures being used to comply with paragraph (d) of this section, or indicating that those procedures are inadequate to prevent electrocution, the employer must safely stop operations and either develop new procedures to comply with paragraph (d) of this section or have the utility owner/operator de-energize and visibly ground or relocate the power line before resuming work.

(j) Devices originally designed by the manufacturer for use as a safety device (see § 1926.1415), operational aid, or a means to prevent power line contact or electrocution, when used to comply with this section, must comply with the manufacturer's procedures for use and conditions of use.

(k) The employer must train each operator and crew member assigned to work with the equipment in accordance with § 1926.1408(g).

POWER LINE SAFETY 1926.1411

While Traveling Under or Near Power Lines with No Load

This section establishes procedures and criteria that must be met for equipment traveling under or near a power line on a construction site with no load. Equipment traveling on a construction site with a load is governed by §§

1926.1408, 1926.1409 or 1926.1410, whichever is appropriate, and § 1926.1417(u).

The employer must ensure that:

(a) The boom/mast and boom/mast support system are lowered sufficiently to meet the requirements of this paragraph.

(b) The clearances specified in Table T of this section are maintained.

(c) The effects of speed and terrain on equipment movement (including movement of the boom/mast) are considered so that those effects do not cause the minimum clearance distances specified in Table T of this section to be breached.

(d) *Dedicated spotter.* If any part of the equipment while traveling will get closer than 20 feet to the power line, the employer must ensure that a dedicated spotter who is in continuous contact with the driver/operator is used. The dedicated spotter must:

(i) Be positioned to effectively gauge the clearance distance.
(ii) Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.
(iii) Give timely information to the operator so that the required clearance distance can be maintained.

(e) Additional precautions for traveling in poor visibility. When traveling at night, or in conditions of poor visibility, in addition to the measures specified in paragraphs (b)(1) through (4) of this section, the employer must ensure that:

(i) The power lines are illuminated or another means of identifying the location of the lines is used.
(ii) A safe path of travel is identified and used.

Load TABLE T

Minimum Clearance Distances While Traveling With No Load

Voltage (nominal, kV, alternating current)	While Traveling – Minimum clearance distance (feet)
Up to 0.75	4
Over .75 to 50	6
Over 50 to 345	10
Over 345 to 750	16
Over 750 to 1,000	20
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

SUBPART I - INSPECTIONS

Modified equipment

(a) Equipment that has had modifications or additions which affect the safe operation of the equipment (such as modifications or additions involving a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) or capacity must be inspected by a qualified person after such modifications/additions have been completed, prior to initial use. The inspection must meet all of the following requirements:

- **(i)** The inspection must assure that the modifications or additions have been done in accordance with the approval obtained pursuant to § 1926.1434 (Equipment modifications).
- **(ii)** The inspection must include functional testing of the equipment.

(b) Equipment must not be used until an inspection under this paragraph demonstrates that the requirements of paragraph (a)(1)(i) of this section have been met.

Repaired/adjusted equipment

CONSTRUCTION CRANES

Prior to performing repairs, Warning or "out of order" signs shall be placed on the crane, also on the floor beneath or on the hook where visible from the floor.

(a) Equipment that has had a repair or adjustment that relates to safe operation (such as: a repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism), must be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use. The inspection must meet all of the following requirements:

(i) The qualified person must determine if the repair/adjustment meets manufacturer equipment criteria (where applicable and available).

(ii) Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person must:

(A) Determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.

(B) Determine if the repair/adjustment meets the criteria developed in accordance with paragraph (b)(1)(ii)(A) of this section.

(iii) The inspection must include functional testing of the repaired/adjusted parts and other components that may be affected by the repair/adjustment.

(b) Equipment must not be used until an inspection under this paragraph demonstrates that the repair/adjustment meets the requirements of paragraph (b)(1)(i) of this section (or, where applicable, paragraph (b)(1)(ii) of this section).

Post-Assembly

(a) Upon completion of assembly, the equipment must be inspected by a qualified person to assure that it is configured in accordance with manufacturer equipment criteria.

(b) Where manufacturer equipment criteria are unavailable, a qualified person must:

(i) Determine if a registered professional engineer (RPE) familiar with the type of equipment involved is needed to develop criteria for the equipment configuration. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.

(ii) Determine if the equipment meets the criteria developed in of this section.

(c) Equipment must not be used until an inspection under this paragraph demonstrates that the equipment is configured in accordance with the applicable criteria.

Each Shift

(a) A competent person must begin a visual inspection prior to each shift the equipment will be used, which must be completed before or during that shift. The inspection must consist of observation for apparent deficiencies. Taking apart equipment components and booming down is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart equipment components or booming down is needed. Determinations made in conducting the inspection must be reassessed in light of observations made during operation. At a minimum the inspection must include all of the following:

(i) Control mechanisms for maladjustments interfering with proper operation.

(ii) Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.

(iii) Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which fl ex in normal operation.

(iv) Hydraulic system for proper fluid level.

(v) Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.

(vi) Wire rope and slings reeving for compliance with the manufacturer's specifications.

(vii) Wire rope, in accordance with § 1926.1413(a).

(viii) Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.

(ix) Tires (when in use) for proper inflation and condition.

(x) Ground conditions around the equipment for proper support, including ground settling under and around outriggers/stabilizers and supporting foundations, ground water accumulation, or similar conditions. This paragraph does not apply to the inspection of ground conditions for railroad tracks and their underlying support when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR part 213.

(xi) The equipment for level position within the tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.

(xii) Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.

(xiii) Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling. This paragraph does not apply to the inspection of rails, rail stops, rail clamps and supporting surfaces when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR part 213.

(xiv) Safety devices and operational aids for proper operation.

(b) If any deficiency in the preceding paragraph (i) through (xiii) of this section (or in additional inspection items required to be checked for specific types of equipment in accordance with other sections of this standard) is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, the

equipment must be taken out of service until it has been corrected. See § 1926.1417.

(i) If any deficiency in the above mentioned list (1)(xiv) of this section (safety devices/operational aids) is identified, the action specified in § 1926.1415 and § 1926.1416 must be taken prior to using the equipment.

Monthly

(a) Each month the equipment is in service it must be inspected by a competent person and documented.

(b) Equipment must not be used until an inspection demonstrates that no corrective action is required.

Documentation

A preventive maintenance program based upon the crane manufacturer's recommendations shall be established.

The following information must be documented and maintained by the employer that conducts the inspection:

(a) The items checked and the results of the inspection.
(b) The name and signature of the person who conducted the inspection and the date.
(i) This document must be retained for a minimum of three months.

Annual / Comprehensive

(a) At least every 12 months the equipment must be inspected by a qualified person.

(b) In addition, at least every 12 months, the equipment must be inspected by a qualified person. Disassembly is required, as necessary, to complete the inspection. The equipment must be inspected for all of the following:

(i) Equipment structure (including the boom and, if equipped, the jib):
- **(A)** Structural members: deformed, cracked, or significantly corroded.
- **(B)** Bolts, rivets and other fasteners: loose, failed or significantly corroded.
- **(C)** Welds for cracks.

(ii) Sheaves and drums for cracks or significant wear.

(iii) Parts such as pins, bearings, shafts, gears, rollers and locking devices for distortion, cracks or significant wear.

(iv) Brake and clutch system parts, linings, pawls and ratchets for excessive wear.

(v) Safety devices and operational aids for proper operation (including significant inaccuracies).

(vi) Gasoline, diesel, electric, or other power plants for safety-related problems (such as leaking exhaust and emergency shut-down feature) and conditions, and proper operation.

(vii) Chains and chain drive sprockets for excessive wear of sprockets and excessive chain stretch.

(viii) Travel steering, brakes, and locking devices, for proper operation.

(ix) Tires for damage or excessive wear.

(x) Hydraulic, pneumatic and other pressurized hoses, fittings and tubing, as follows:
- **(A)** Flexible hose or its junction with the fittings for indications of leaks.
- **(B)** Threaded or clamped joints for leaks.
- **(C)** Outer covering of the hose for blistering, abnormal deformation or other signs of failure/impending failure.
- **(D)** Outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing.

(xi) Hydraulic and pneumatic pumps and motors, as follows:
- **(A)** Performance indicators: unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure.
- **(B)** Loose bolts or fasteners.

(C) Shaft seals and joints between pump sections for leaks.

(xii) Hydraulic and pneumatic valves, as follows:

(A) Spools: sticking, improper return to neutral, and leaks.

(B) Leaks.

(C) Valve housing cracks.

(D) Relief valves: failure to reach correct pressure (if there is a manufacturer procedure for checking pressure, it must be followed).

(xiii) Hydraulic and pneumatic cylinders, as follows:

(A) Drifting caused by fluid leaking across the piston.

(B) Rod seals and welded joints for leaks.

(C) Cylinder rods for scores, nicks, or dents.

(D) Case (barrel) for significant dents.

(E) Rod eyes and connecting joints: loose or deformed.

(xiv) Outrigger or stabilizer pads/fl oats for excessive wear or cracks.

(xv) Slider pads for excessive wear or cracks

(xvi) Electrical components and wiring for cracked or split insulation and loose or corroded terminations.

(xvii) Warning labels and decals originally supplied with the equipment by the manufacturer or otherwise required under this standard: missing or unreadable.

(xviii) Originally equipped operator seat (or equivalent): missing.

(xix) Operator seat: unserviceable.

(xx) Originally equipped steps, ladders, handrails, guards: missing.

(xxi) Steps, ladders, handrails, guards: in unusable/unsafe condition.

(c) This inspection must include functional testing to determine that the equipment as configured in the inspection is functioning properly.

(d) If any deficiency is identified, an immediate determination must be made by the qualified person as to whether the deficiency constitutes a safety hazard or, though not yet a safety hazard, needs to be monitored in the monthly inspections.

(e) If the qualified person determines that a deficiency is a safety hazard, the equipment must be taken out of service until it has been corrected, except when temporary alternative measures are implemented as specified in § 1926.1416(d) or § 1926.1435(e). See § 1926.1417.

(f) If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.

(g) *Documentation of annual/comprehensive inspection.* The following information must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection:

(i) The items checked and the results of the inspection.

(ii) The name and signature of the person who conducted the inspection and the date.

Severe Service

Where the severity of use/conditions is such that there is a reasonable probability of damage or excessive wear (such as loading that may have exceeded rated capacity, shock loading that may have exceeded rated capacity, prolonged exposure to a corrosive atmosphere), the employer must stop using the equipment and a qualified person must:

(a) Inspect the equipment for structural damage to determine if the equipment can continue to be used safely.

(b) In light of the use/conditions determine whether any items/conditions listed in this section need to be inspected; if so, the qualified person must inspect those items/conditions.

(i) If a deficiency is found, the employer must follow the requirements in paragraphs (f)(4) through (6) of this section.

Equipment Not In Regular Use

Equipment that has been idle for 3 months or more must be inspected by a qualified person in accordance with the requirements of this section before initial use.

All documents produced under this section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

SUBPART J - SAFETY DEVICES 1926.1415

The following safety devices are required on all equipment covered by this subpart, unless otherwise specified and must be in proper working order before operations can begin:

(1) *Crane level indicator.*

- **(i)** The equipment must have a crane level indicator that is either built into the equipment or is available on the equipment.
- **(ii)** If a built-in crane level indicator is not working properly, it must be tagged-out or removed. If a removable crane level indicator is not working properly, it must be removed.
- **(iii)** This requirement does not apply to portal cranes, derricks, floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation.

(2) Boom stops, except for derricks and hydraulic booms.

(3) Jib stops (if a jib is attached), except for derricks.

(4) Equipment with foot pedal brakes must have locks.

(5) Hydraulic outrigger jacks and hydraulic stabilizer jacks must have an integral holding device/check valve.

(6) Equipment on rails must have rail clamps and rail stops, except for portal cranes.

(7) *Horn*

- **(i)** The equipment must have a horn that is either built into the equipment or is on the equipment and immediately available to the operator.
- **(ii)** If a built-in horn is not working properly, it must be tagged-out or removed. If a removable horn is not working properly, it must be removed.

Proper Operation

Operations must not begin unless all of the devices listed in this section are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. If any of the devices listed in this section are not in proper working order, the equipment must be taken out of service and operations must not resume until the device is again working properly. See § 1926.1417 (Operation). Alternative measures are not permitted to be used.

SUBPART K - OPERATIONAL AIDS 1926.1416

The devices listed in this section are required on all equipment covered in this section unless otherwise noted or specified. Operation of equipment must not begin unless the listed operational aids are in proper working order, except where an operational aid is being repaired and the employer uses the specified temporary alternative measures.

If while operating the equipment an operational aid stops working properly, the operator must safely stop operations until the temporary alternative measures are implemented or the device is again operational and working properly.

Category I Operational Aids

Operational aids listed below that are not working properly must be repaired no later than 7 calendar days after the deficiency occurs unless the company can document that the part(s) have been ordered within the 7 calendar days of the occurrence of the deficiency.

(a) Boom hoist limiting device (for equipment manufactured after Dec. 16, 1969)
(b) Luffing jib limiting device
(c) Anti two-blocking device

i. Telescopic boom cranes manufactured after Feb. 28, 1992
ii. Lattice boom cranes manufactured after Feb. 28, 1992
iii. Articulating cranes manufactured after Dec. 31, 1999

Category II Operational Aids

CONSTRUCTION CRANES

Operational aids listed below that are not working properly must be repaired no later than 30 days after the deficiency occurs unless the company documents that the part(s) have been ordered within 7 calendar days of the occurrence of the deficiency and the part is not received in time to complete the repair within the 30 calendar days. Once receipt of the parts has been made, the repair must be completed within 7 calendar days.

(a) Boom angle or radius indicator
(b) Jib angle indicator
(c) Boom length indicator
(d) Load weighing and similar devices

The following devices are required on equipment manufactured after 1 year and 90 days after the date of publication in the Federal Register.

(a) Outrigger/stabilizer position sensor / monitor if the equipment has outriggers or stabilizers.
(b) Hoist drum rotation indicator if the equipment has a hoist drum not visible from the operator's station.

OPERATION 1926.1417

The company must comply with all manufacturer procedures applicable to the operational functions of equipment, including its use with attachments. If manufacturer procedures are not available, the company must develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments.

All procedures must be readily accessible to the operator including rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions, and operator's manual. It is recommended that these items be located in the cab of the equipment for the operator to refer to if needed.

In addition, the operator must not engage in any practice or activity that diverts his / her attention while actually engaged in operating the equipment; such as the use of cellular phones (other than when used for signal communications.) The operator must not leave the controls while the load is suspended, except for the following conditions:

(a) The operator remains adjacent to the equipment and is not engaged in other duties.
(b) The load is to be held suspended for a period of time exceeding normal lifting operations.
(c) The competent person determines that it is safe to do so.
(d) Barricades or caution lines, and notices are erected to prevent all employees from entering the fall zone.

When a local storm warning has been issued, a competent person must determine whether it is necessary to implement manufacturer recommendations for securing the equipment. In addition, the competent person must adjust the equipment and/or operations to address the effect of wind, ice, and snow on equipment stability and rated capacity.

The operator of the equipment must not operate the equipment in excess of its rated capacity and must determine whether or not lift is within the rated capacity of the equipment by a least one of the following methods:

(a) The weight of the load is determined from a recognized source such as the manufacturer or supplier.
(b) The operator begins the lift using the equipment's load moment indicator and the load does not exceed 75% of the maximum rated capacity at the longest radius that will be used during the lift operation.

Caution must be used not to come into contact with any obstructions while in operation and the equipment must never be used to drag or pull loads sideways.

Tag lines or restraints must be used if necessary to prevent rotation of the load that would be hazardous.

AUTHORITY to STOP OPERATION 1926.1418

Whenever there is a concern as to safety, the operator must have and does have the authority to stop or refuse to handle loads until a qualified person has determined that operations can continue safely.

SIGNALS 1926.1419-1422

A signal person must be provided in each of the following situations:

(a) The point of operation, meaning the load travel or the area near or at load placement, is not in full view of the operator.
(b) The equipment is traveling and the view in the direction of travel is obstructed.
(c) Due to site specific safety concerns.

Signals to operators must be by either hand, voice, audible, or new signals and must be transmitted between the operator and the signal person and must be maintained. If the signals are interrupted at any time, the operator must safely stop operations until the signals can be re-established.

Only one person may give signals to a crane/derrick at a time, except for when anyone becomes aware of a safety problem they must alert the operator or signal person by giving the stop or emergency stop signal.

If radio, telephone, or electronic devices are being used to give signals, they must be tested prior to beginning operations to ensure that the signal transmission is effective, clear, and reliable.

If hand signals are used, hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations.

WORK AREA CONTROL 1926.1424

To prevent employees from entering hazard areas that poses a reasonably foreseeable risk of striking or pinching or crushing an employee against another part of the equipment or another object, the employer must train employees assigned to work on or near these hazard areas how to recognize struck-by and pinch / crush hazard areas posed by rotating equipment. Some controls that can be used are control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard area. When it is not feasible to erect such barriers, the hazard area must be clearly marked by a combination of warning signs (such as “DANGER – SWING / CRUSH Zone”) and high visibility markings on the equipment or deck.

SUBPART L - OPERATOR QUALIFICATION and CERTIFICATION

The employer must ensure that, prior to operating any equipment the person operating the equipment is qualified or certified to operate the equipment. In addition, whenever

operator qualifications or certifications are required under § 1926.1427, the employer must provide the qualification or certification at no cost to operators who are employed by the employer.

Once certified, the certification is valid for 5 years and is portable. Refresher training is required to be administered to operators every 4 years.

Employees not qualified or certified are permitted to operate equipment only as an operator-in-training and only when:

- Employer provides sufficient training prior to operating equipment.
- Tasks are within the operator-in-training's ability.
- Operator-in-training is continuously monitored by an individual who meets the following:
  - Operator trainer is an agent of the employer.
  - Operator trainer is certified or qualified.
  - Operator trainer is not performing any other tasks other than monitoring the operator-in-training.
  - Operator trainer and operator-in-training must be in direct line of sight of each other and communicate with each other verbally or by hand signals.

Certification Criteria 1926.1427

Qualifications and certifications must be based, at a minimum, on the following:

(1) A determination through a written test that:

(i) The individual knows the information necessary for safe operation of the specific type of equipment the individual will operate, including all of the following:

(a) The controls and operational/performance characteristics.

(b) Use of, and the ability to calculate (manually or with a calculator), load/capacity information on a variety of configurations of the equipment.

(c) Procedures for preventing and responding to power line contact.

(d) Technical knowledge similar to the subject matter criteria listed in Appendix C of this subpart applicable to the specific

type of equipment the individual will operate. Use of the Appendix C criteria meets the requirements of this provision.

(e) Technical knowledge applicable to:

(1) The suitability of the supporting ground and surface to handle expected loads.

(2) Site hazards.

(3) Site access.

(f) This subpart, including applicable incorporated materials.

(ii) The individual is able to read and locate relevant information in the equipment manual and other materials containing information referred to in paragraph (j)(1)(i) of this section.

(2) A determination through a practical test that the individual has the skills necessary for safe operation of the equipment, including the following:

(i) Ability to recognize, from visual and auditory observation, the items listed in § 1926.1412(d) (shift inspection).

(ii) Operational and maneuvering skills.

(iii) Application of load chart information.

(iii) Application of safe shut-down and securing procedures.

Physical / medical requirements for crane operators will be in accordance with API RP 2D and shall consist of:

- Individuals must have vision of at least 20/30 Snellen in one eye and 20/50 in the other eye with or without glasses. The individual shall also have proper depth perception.
- Individuals shall be able to distinguish between red, yellow, and green.
- Individuals shall have adequate hearing with or without the use of a hearing aid adequate for the specific operation.
- Individuals shall have no history of disabling medical condition(s) which may be sufficient reason for disqualification.
- Individuals shall have a medical evaluation at least every four (4) years.

SIGNAL PERSON QUALIFICATIONS 1926.1428

CONSTRUCTION CRANES

The employer of the signal person must ensure that each signal person meets the Qualification Requirements prior to giving any signals. This requirement must be met by using either Option (1) or Option (2) below:

(1) *Option (1) – Third party qualified evaluator.* The signal person has documentation from a third party qualified evaluator (see Qualified Evaluator (third party), § 1926.1401 for definition) showing that the signal person meets the Qualification Requirements (see paragraph (c) of this section).

(2) *Option (2) – Employer's qualified evaluator.* The employer's qualified (see Qualified Evaluator (not a third party), § 1926.1401 for definition) evaluator assesses the individual and determines that the individual meets the Qualification Requirements (see paragraph (c) of this section) and provides documentation of that determination. An assessment by an employer's qualified evaluator under this option is not portable – other employers are not permitted to use it to meet the requirements of this section.

(3) The employer must make the documentation for whichever option is used available at the site while the signal person is employed by the employer. The documentation must specify each type of signaling (e.g. hand signals, radio signals, etc.) for which the signal person meets the requirements of paragraph (c) of this section.

If subsequent actions by the signal person indicate that the individual does not meet the Qualification Requirements, the employer must not allow the individual to continue working as a signal person until re-training is provided and a re-assessment is made that confirms that the individual meets the Qualification Requirements.

Qualification Requirements 1926.1428

Each signal person must:

(1) Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.

(2) Be competent in the application of the type of signals used.

(3) Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.

(4) Know and understand the relevant requirements of § 1926.1419 through § 1926.1422 and § 1926.1428.

(5) Demonstrate that he/she meets the requirements of this section through an oral or written test, and through a practical test.

QUALIFICATIONS OF MAINTENANCE & REPAIR EMPLOYEES 1926.1429

Maintenance, inspection and repair personnel are permitted to operate the equipment only where all of the following requirements are met:

(1) The operation is limited to those functions necessary to perform maintenance, inspect the equipment, or verify its performance.

(2) The personnel either:

(i) Operate the equipment under the direct supervision of an operator who meets the requirements of § 1926.1427 (Operator qualification and certification); or

(ii) Are familiar with the operation, limitations, characteristics and hazards associated with the type of equipment.

Maintenance and repair personnel must meet the definition of a qualified person with respect to the equipment and maintenance/repair tasks performed.

TRAINING 1926.1430

The employer must provide training as follows:

(a) Overhead power lines
(b) Signal persons
(c) Operators
(d) Competent persons and qualified persons
(e) Crush/pinch points
(f) Tag-out
(g) Training administration

SUBPART L – HOISTING PERSONNEL

CONSTRUCTION CRANES

The use of equipment to hoist employees is prohibited except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project's structural design or worksite conditions.

Use of Personnel Platform

(1) When using equipment to hoist employees, the employees must be in a personnel platform that meets the requirements of paragraph (e) of this section.

(2) Exceptions: A personnel platform is not required for hoisting employees:

- **(i)** Into and out of drill shafts that are up to and including 8 feet in diameter.
- **(ii)** In pile driving operations (see paragraph (p) of this section for requirements for hoisting these employees).
- **(iii)** Solely for transfer to or from a marine worksite in a marine-hoisted personnel transfer device (see paragraph (r) of this section for requirements for hoisting these employees).
  - **(1)** In storage-tank (steel or concrete), shaft and chimney operations (see paragraph(s) of this section for requirements for hoisting these employees).

Equipment Set-Up

(1) The equipment must be uniformly level, within one percent of level grade, and located on footing that a qualified person has determined to be sufficiently firm and stable.

(2) Equipment with outriggers or stabilizers must have them all extended and locked. The amount of extension must be the same for all outriggers and stabilizers and in accordance with manufacturer procedures and load charts.

Equipment Criteria

CONSTRUCTION CRANES

(1) *Capacity: use of suspended personnel platforms.* The total load (with the platform loaded, including the hook, load line and rigging) must not exceed 50 percent of the rated capacity for the radius and configuration of the equipment, except during proof testing

(2) *Capacity: use of boom-attached personnel platforms.* The total weight of the loaded personnel platform must not exceed 50 percent of the rated capacity for the radius and configuration of the equipment (except during proof testing).

(3) *Capacity: hoisting personnel without a personnel platform.* When hoisting personnel without a personnel platform pursuant to paragraph (b)(2) of this section, the total load (including the hook, load line, rigging and any other equipment that imposes a load) must not exceed 50 percent of the rated capacity for the radius and configuration of the equipment, except during proof testing.

(4) When the occupied personnel platform is in a stationary working position, the load and boom hoist brakes, swing brakes, and operator actuated secondary braking and locking features (such as pawls or dogs) or automatic secondary brakes must be engaged.

(5) *Devices.*

(i) Equipment (except for derricks and articulating cranes) with a variable angle boom must be equipped with all of the following:

(A) A boom angle indicator, readily visible to the operator, and

(B) A boom hoist limiting device.

(ii) Articulating cranes must be equipped with a properly functioning automatic overload protection device.

(iii) Equipment with a luffing jib must be equipped with:

(A) A jib angle indicator, readily visible to the operator

(B) A jib hoist limiting device.

(iv) Equipment with telescoping booms must be equipped with a device to indicate the boom's extended length clearly to the operator, or must have measuring marks on the boom.

(v) *Anti two-block* A device which automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component) must be

used. The device(s) must prevent such damage/failure at all points where two-blocking could occur. Exception: this device is not required when hoisting personnel in pile driving operations. Instead, paragraph (p)(2) of this section specifies how to prevent two-blocking during such operations.

(vi) *Controlled load lowering* The load line hoist drum must have a system, other than the load line hoist brake, which regulates the lowering rate of speed of the hoist mechanism. This system or device must be used when hoisting personnel.

(NOTE: Free fall of the load line hoist is prohibited (see § 1926.1426(d); the use of equipment in which the boom hoist mechanism can free fall is also prohibited (see § 1926.1426(a)(1).)

(vii) *Proper operation required.* Personnel hoisting operations must not begin unless the devices listed in this section are in proper working order. If a device stops working properly during such operations, the operator must safely stop operations. Personnel hoisting operations must not resume until the device is again working properly. Alternative measures are not permitted. (See § 1926.1417 for tag-out and related requirements.)

(6) Direct attachment of a personnel platform to a luffing jib is prohibited.

Personnel Platform Criteria

(1) A qualified person familiar with structural design must design the personnel platform and attachment/suspension system used for hoisting personnel.

(2) The system used to connect the personnel platform to the equipment must allow the platform to remain within 10 degrees of level, regardless of boom angle.

(3) The suspension system must be designed to minimize tipping of the platform due to movement of employees occupying the platform.

(4) The personnel platform itself (excluding the guardrail system and personal fall arrest system anchorages), must be capable of supporting, without failure, its own weight and at least five times the maximum intended load.

(5) All welding of the personnel platform and its components must be performed by a certified welder familiar with the weld grades, types and material specified in the platform design.

(6) The personnel platform must be equipped with a guardrail system which meets the requirements of subpart M of this part, and must be enclosed at least from the toe-board to mid-rail with either solid construction material or expanded metal having openings no greater than ½ inch (1.27 cm). Points to which personal fall arrest systems are attached must meet the anchorage requirements in subpart M of this part.

(7) A grab rail must be installed inside the entire perimeter of the personnel platform except for access gates/doors.

(8) *Access gates/doors.* If installed, access gates/doors of all types (including swinging, sliding, folding, or other types) must:

- **(i)** Not swing outward. If due to the size of the personnel platform, such as a 1-person platform, it is infeasible for the door to swing inward and allow safe entry for the platform occupant, then the access gate/door may swing outward.
- **(ii)** Be equipped with a device that prevents accidental opening.

(9) Headroom must be sufficient to allow employees to stand upright in the platform.

(10) In addition to the use of hard hats, employees must be protected by overhead protection on the personnel platform when employees are exposed to falling objects. The platform overhead protection must not obscure the view of the operator or platform occupants (such as wire mesh that has up to ½ inch openings), unless full protection is necessary.

(11) All edges exposed to employee contact must be smooth enough to prevent injury.

(12) The weight of the platform and its rated capacity must be conspicuously posted on the platform with a plate or other permanent marking.

Personnel Platform Loading

(1) The personnel platform must not be loaded in excess of its rated capacity.

Use

(i) Personnel platforms must be used only for employees, their tools, and the materials necessary to do their work. Platforms must not be used to hoist materials or tools when not hoisting personnel.

(ii) *Exception:* materials and tools to be used during the lift, if secured and distributed in accordance with paragraph (f)(3) of this section may be in the platform for trial lifts.

(2) Materials and tools must be:

(i) Secured to prevent displacement.

(ii) Evenly distributed within the confines of the platform while it is suspended.

(3) The number of employees occupying the personnel platform must not exceed the maximum number the platform was designed to hold or the number required to perform the work, whichever is less.

Work Practices

(1) Hoisting of the personnel platform must be performed in a slow, controlled, cautious manner, with no sudden movements of the equipment or the platform.

(2) Platform occupants must:

(i) Keep all parts of the body inside the platform during raising, lowering, and horizontal movement. This provision does not apply to an occupant of the platform when necessary to position the platform or while performing the duties of a signal person.

(ii) Not stand, sit on, or work from the top or intermediate rail or toe-board, or use any other means/device to raise their working height.

(iii) Not pull the platform out of plumb in relation to the hoisting equipment.

(3) Before employees exit or enter a hoisted personnel platform that is not landed, the platform must be secured to the structure where the work is to be performed, unless the employer can demonstrate that securing to the structure would create a greater hazard.

(4) If the platform is tied to the structure, the operator must not move the platform until the operator receives confirmation that it is freely suspended.

(5) Tag lines must be used when necessary to control the platform.

(6) *Platforms without controls* Where the platform is not equipped with controls, the equipment operator must remain at the equipment controls, on site, and in view of the equipment, at all times while the platform is occupied.

(7) *Platforms with controls.* Where the platform is equipped with controls, all of the following must be met at all times while the platform is occupied:

(i) The occupant using the controls in the platform must be a qualified person with respect to their use, including the safe limitations of the equipment and hazards associated with its operation.

(ii) The equipment operator must be at a set of equipment controls that include boom and swing functions of the equipment, and must be on site and in view of the equipment.

(iii) The platform operating manual must be in the platform or on the equipment.

(8) *Environmental conditions.*

(i) *Wind.* When wind speed (sustained or gusts) exceeds 20 mph at the personnel platform, a qualified person must determine if, in light of the wind conditions, it is not safe to lift personnel. If it is not, the lifting operation must not begin (or, if already in progress, must be terminated).

(ii) *Other weather and environmental conditions.* A qualified person must determine if, in light of indications of

dangerous weather conditions, or other impending or existing danger, it is not safe to lift personnel. If it is not, the lifting operation must not begin (or, if already in progress, must be terminated).

(9) Employees being hoisted must remain in direct communication with the signal person (where used), or the operator.

(10) *Fall protection*

(i) Except over water, employees occupying the personnel platform must be provided and use a personal fall arrest system. The system must be attached to a structural member within the personnel platform. When working over or near water, the requirements of § 1926.106 apply.

(ii) The fall arrest system, including the attachment point (anchorage) used to comply with paragraph (i) of this section, must meet the requirements in § 1926.502.

(11) *Other load lines*

(i) No lifts must be made on any other of the equipment's load lines while personnel are being hoisted, except in pile driving operations.

(ii) *Factory-produced boom-mounted personnel platforms that incorporate a winch as original equipment.* Loads are permitted to be hoisted by such a winch while employees occupy the personnel platform only where the load on the winch line does not exceed 500 pounds and does not exceed the rated capacity of the winch and platform.

Pre-Lift Meeting

A pre-lift meeting must be:

(1) Held to review the applicable requirements of this section and the procedures that will be followed.

(2) Attended by the equipment operator, signal person (if used for the lift), employees to be hoisted, and the person responsible for the task to be performed.

(3) Held prior to the trial lift at each new work location, and must be repeated for any employees newly assigned to the operation.

Hoisting Personnel near Power Lines

Hoisting personnel within 20 feet of a power line that is up to 350 kV, and hoisting personnel within 50 feet of a power line that is over 350 kV, is prohibited, except for work covered by subpart V of this part (Power Transmission and Distribution).

Hoisting Personnel for Pile Driving Operations

When hoisting an employee in pile driving operations, the following requirements must be met:

(1) The employee must be in a personnel platform or boatswain's chair.

(2) *For lattice boom cranes:* Clearly mark the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached. For telescopic boom cranes: Clearly mark the cable (so that it can be easily seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, and use a spotter who is in direct communication with the operator to inform the operator when this point is reached.

(3) If using a personnel platform, paragraphs (b) through (n) of this section apply.

(4) If using a boatswain's chair:

- **(i)** Where the terms "personnel platform" or "platform" are used in these paragraphs, substitute them with "boatswains' chair."
- **(ii)** The employee must be hoisted in a slow, controlled descent and ascent.
- **(iii)** The employee must use personal fall protection equipment, including a full body harness, independently attached to the lower load block or overhaul ball.
- **(iv)** The fall protection equipment must meet the applicable requirements in § 1926.502.
- **(v)** The boatswain's chair itself (excluding the personal fall arrest system anchorages), must be capable of

supporting, without failure, its own weight and at least five times the maximum intended load.

(vi) No more than one person must be hoisted at a time.

Hoisting Personnel for Marine Transfer

When hoisting employees solely for transfer to or from a marine worksite, the employee must be in either a personnel platform or a marine-hoisted personnel transfer device. The transfer device must be used only for transferring workers and the number of workers occupying the transfer device must not exceed the maximum number it was designed to hold. In addition, each employee must wear a U.S. Coast Guard personal flotation device approved for industrial use.

SUBPART M - EQUIPMENT MODIFICATIONS 1926.1434

Modifications or additions which affect the capacity or safe operation of the equipment are prohibited except where the requirements of paragraphs (a)(1), (a)(2), (a)(3), (a)(4), or (a)(5) of this section are met.

(1) *Manufacturer review and approval.*

(i) The manufacturer approves the modifications/additions in writing.

(ii) The load charts, procedures, instruction manuals and instruction plates/tags/decals are modified as necessary to accord with the modification/addition.

(iii) The original safety factor of the equipment is not reduced.

(2) *Manufacturer refusal to review request.* The manufacturer is provided a detailed description of the proposed modification/addition, is asked to approve the modification/ addition, but it declines to review the technical merits of the proposal or fails, within 30 days, to acknowledge the request or initiate the review, and all of the following are met:

(i) A registered professional engineer who is a qualified person with respect to the equipment involved:

(A) Approves the modification/addition and specifies the equipment configurations to which that approval applies, and

(B) Modifies load charts, procedures, instruction manuals and instruction plates/tags/decals as necessary to accord with the modification/addition.

(ii) The original safety factor of the equipment is not reduced.

(3) *Unavailable manufacturer.* The manufacturer is unavailable and the requirements of paragraphs (a)(2)(i) and (ii) of this section are met.

(4) *Manufacturer does not complete the review within 120 days of the request.* The manufacturer is provided a detailed description of the proposed modification/addition, is asked to approve the modification/ addition, agrees to review the technical merits of the proposal, but fails to complete the review of the proposal within 120 days of the date it was provided the detailed description of the proposed modification/addition, and the requirements of paragraphs (a)(2)(i) and (ii) of this section are met.

(5) *Multiple manufacturers of equipment designed for use on marine work sites.* The equipment is designed for marine work sites, contains major structural components from more than one manufacturer, and the requirements of paragraphs (a)(2)(i) and (ii) of this section are met.

Modifications or additions which affect the capacity or safe operation of the equipment are prohibited where the manufacturer, after a review of the technical safety merits of the proposed modification/addition, rejects the proposal and explains the reasons for the rejection in a written response. If the manufacturer rejects the proposal but does not explain the reasons for the rejection in writing, the employer may treat this as a manufacturer refusal to review the request under paragraph (a)(2) of this section.

The provisions of this section do not apply to modifications made or approved by the military.

SUBPART N - FLOATING CRANES/DERRICKS and LAND CRANES/DERRICKS ON BARGES 1926.1437

This section contains supplemental requirements for floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation (i.e., vessel/flotation device). The sections of this subpart apply to floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation, unless specified otherwise. The requirements of this section do not apply when using jacked barges when the jacks are deployed to the river, lake, or seabed and the barge is fully supported by the jacks.

General Requirements

CONSTRUCTION CRANES

The requirements of these sections apply to both floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation.

Work Area Control

(1) The requirements of § 1926.1424 (Work area control) apply, except for § 1926.1424(a)(2)(ii).

(2) The employer must either:

a. Erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard areas.

b. Clearly mark the hazard areas by a combination of warning signs (such as, “Danger – Swing/Crush Zone”) and high visibility markings on the equipment that identify the hazard areas. In addition, the employer must train each employee to understand what these markings signify.

Moving a Load

(1) When moving a load the following should be done:

- Before traveling a crane with a load a designated person shall be responsible for determining and controlling safety. Decisions such as position of the load, boom location, ground support, travel route, and speed of movement shall be in accord with his determinations.
- Center the hook over the load to keep the cables from slipping out of the drum grooves and overlapping, and to prevent the load from swinging when it is lifted. Inspect the drum to verify that the cable is in the grooves.
- Use a tag line when loads must traverse long distances or must otherwise be controlled. Manila rope may be used for tag lines.
- Plan and check the travel path to avoid personnel and obstructions.
- Lift the load only high enough to clear the tallest obstruction in the travel path.
- Start and stop slowly.
- Land the load when the move is finished. Choose a safe landing.
- ***Never*** leave suspended loads unattended. In an emergency where the crane or hoist has become inoperative, if a load must be left suspended, barricade and post signs in the surrounding area, under the load, and on all four sides. Lock open and tag the crane or hoist's main electrical disconnect switch.

- On any truck-mounted cranes, **NO** loads shall be lifter over the front area except by the crane manufacturer.

Additional Safety Devices

In addition to the safety devices listed in § 1926.1415, the following safety devices are required:

(1) Barge, pontoon, vessel or other means of flotation list and trim device. The safety device must be located in the cab or, when there is no cab, at the operator's station.
(2) Positive equipment house lock.
(3) *Wind speed and direction indicator.* A competent person must determine if wind is a factor that needs to be considered; if wind needs to be considered, a wind speed and direction indicator must be used.

Operational Aids

An anti two-block device is required only when hoisting personnel or hoisting over an occupied cofferdam or shaft. In addition, section 1926.1416(e)(4) (Load weighing and similar devices) does not apply to dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, and pile driving work performed under this section.

Accessibility of Procedures Applicable To Equipment Operation

If the crane/derrick has a cab, the requirements of § 1926.1417(c) apply. If the crane/derrick does not have a cab, the employer must ensure that:

(1) Rated capacities (load charts) are posted at the operator's station. If the operator's station is moveable (such as with pendant-controlled equipment), the load charts are posted on the equipment.
(2) Procedures applicable to the operation of the equipment (other than load charts), recommended operating speeds, special hazard warnings, instructions and operators manual, must be readily available on board the vessel/flotation device.

CONSTRUCTION CRANES

Inspections

In addition to meeting the requirements of § 1926.1412 for inspecting the crane/derrick, the employer must inspect the barge, pontoons, vessel or other means of flotation used to support a floating crane/derrick or land crane/derrick, and ensure that:

(1) *Shift.* For each shift inspection, the means used to secure/attach the equipment to the vessel/flotation device is in proper condition, including wear, corrosion, loose or missing fasteners, defective welds, and (when applicable) insufficient tension.

(2) *Monthly.* For each monthly inspection:

- **(i)** The means used to secure/attach the equipment to the vessel/flotation device is in proper condition, including inspection for wear, corrosion, and, when applicable, insufficient tension.
- **(ii)** The vessel/flotation device is not taking on water.
- **(iii)** The deck load is properly secured.
- **(iv)** The vessel/flotation device is watertight based on the condition of the chain lockers, storage, fuel compartments, and hatches.
- **(v)** The firefighting and lifesaving equipment is in the cab and functional.

(3) The shift and monthly inspections are conducted by a competent person, and:

- **(i)** If any deficiency is identified, an immediate determination is made by a qualified person whether the deficiency constitutes a hazard.
- **(ii)** If the deficiency is determined to constitute a hazard, the vessel/flotation device is removed from service until the deficiency has been corrected.

(4) *Annual: external vessel/flotation device inspection.* For each annual inspection:

- **(i)** The external portion of the barge, pontoons, vessel or other means of flotation used is inspected annually by a qualified person who has expertise with respect to vessels/flotation devices and that the inspection includes the following items:

(A) The items identified in paragraphs (h)(1) (*Shift*) and (h)(2) (*Monthly*) of this section.

(B) Cleats, bitts, chocks, fenders, capstans, ladders, and stanchions, for significant corrosion, wear, deterioration, or deformation that could impair the function of these items.

(C) External evidence of leaks and structural damage; evidence of leaks and damage below the waterline may be determined through internal inspection of the vessel/flotation device.

(D) Four-corner draft readings.

(E) Firefighting equipment for serviceability.

(ii) Rescue skiffs, lifelines, work vests, life preservers and ring buoys are inspected for proper condition.

(iii) If any deficiency is identified, an immediate determination is made by the qualified person whether the deficiency constitutes a hazard or, though not yet a hazard needs to be monitored in the monthly inspections.

(A) If the qualified person determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected. See requirements in § 1926.1417(f).

(B) If the qualified person determines that, though not presently a hazard, the deficiency needs to be monitored, the deficiency is checked in the monthly inspections.

(5) *Four-year: internal vessel/flotation device inspection.* For each four-year inspection:

(i) A marine engineer, marine architect, licensed surveyor, or other qualified person who has expertise with respect to vessels/flotation devices surveys the internal portion of the barge, pontoons, vessel, or other means of flotation.

(ii) If the surveyor identifies a deficiency, an immediate determination is made by the surveyor as to whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly or annual inspections, as appropriate.

(A) If the surveyor determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected.

(B) If the surveyor determines that, though not presently a hazard, the deficiency needs to be monitored, the deficiency is checked in the monthly or annual inspections, as appropriate.

(6) *Documentation.* The monthly and annual inspections required in this section are documented in accordance with §§ 1926.1412 (e)(3) and 1926.1412(f)(7), respectively, and that the four-year inspection required this section is documented in accordance with § 1926.1412(f)(7), except that the documentation for that inspection must be retained for a minimum of 4 years. All such documents must be made available, during the applicable document retention period, to all persons who conduct inspections in accordance with § 1926.1412.

Working with a Diver

The employer must meet the following additional requirements when working with a diver in the water:

(1) If a crane/derrick is used to get a diver into and out of the water, it must not be used for any other purpose until the diver is back on board. When used for more than one diver, it must not be used for any other purpose until all divers are back on board.

(2) The operator must remain at the controls of the crane/derrick at all times.

(3) In addition to the requirements in §§ 1926.1419 through 1926.1422 (Signals), either:

(i) A clear line of sight must be maintained between the operator and tender; or

(ii) The signals between the operator and tender must be transmitted electronically.

(4) The means used to secure the crane/derrick to the vessel/flotation device (see paragraph (n)(5) of this section) must not allow any amount of shifting in any direction.

Manufacturer's Specifications and Limitations

(1) The employer must ensure that the barge, pontoons, vessel, or other means of flotation must be capable of withstanding imposed environmental, operational and in-transit loads when used in accordance with the manufacturer's specifications and limitations.

(2) The employer must ensure that the manufacturer's specifications and limitations with respect to environmental, operational, and in-transit loads for a barge, pontoon, vessel, or other means of flotation are not exceeded or violated.

(3) When the manufacturer's specifications and limitations are unavailable, the employer must ensure that the specifications and limitations established by a qualified person with respect to environmental, operational and in-transit loads for the barge, pontoons, vessel, or other means of flotation are not exceeded or violated.

TYPE OF CRANE MOUNTING	MAXIMUM LOAD RATINGS (PERCENT TIPPING LOADS)
Locomotive, without outriggers:	**-**
Booms 60 feet or less	**85%**
Booms over 60 feet	**85%**
Locomotive, using outriggers fully extended	**80%**
Crawler, without outriggers	**75%**
Crawler, using outriggers fully extended	**85%**
Truck and wheel mounted without outriggers or using outriggers fully extended	**85%**

Floating Cranes/Derricks

For equipment designed by the manufacturer (or employer) for marine use by permanent attachment to barges, pontoons, vessels or other means of flotation:

(1) *Load charts.*

(i) The employer must not exceed the manufacturer load charts applicable to operations on water. When using these charts, the employer must comply with all parameters and limitations (such as dynamic and environmental parameters) applicable to the use of the charts.

(ii) The employer must ensure that load charts take into consideration a minimum wind speed of 40 miles per hour.

(2) The employer must ensure that the requirements for maximum allowable list and maximum allowable trim as specified in Table M1 of this section are met.

TABLE M1

Equipment designed for marine use by permanent attachment (other than derricks):

Rated Capacity	Maximum Allowable List	Maximum Allowable Trim
25 tons or less	5 degrees	5 degrees
Over 25 tons	7 degrees	7 degrees

Derricks designed for marine use by permanent attachment:

Any rated capacity	10 degrees	10 degrees

(3) The employer must ensure that the equipment is stable under the conditions specified in Tables M2 and M3 of this section. (Note: Freeboard is the vertical distance between the water line and the main deck of the vessel.)

TABLE M2

Operated at	Wind speed	Minimum freeboard
Rated capacity	60 mph	2 ft
Rated capacity plus 25%	60 mph	1 ft

High boom, no load	60 mph	2 *ft*

TABLE M3

For backward stability of the boom:

Operated at	Wind speed
High boom, no load, full back list (least stable condition)	90 mph

(4) If the equipment is employer-made, it must not be used unless the employer has documents demonstrating that the load charts and applicable parameters for use meet the requirements of paragraphs (m)(1) through (3) of this section. Such documents must be signed by a registered professional engineer who is a qualified person with respect to the design of this type of equipment (including the means of flotation).

(5) The employer must ensure that the barge, pontoons, vessel or other means of flotation used:

(i) Are structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick's maximum rated capacity with all planned and actual deck loads and ballasted compartments.

(ii) Have a subdivided hull with one or more longitudinal watertight bulkheads for reducing the free-surface effect.

(3) Have access to void compartments to allow for inspection and pumping.

Land Cranes/Derricks

For land cranes/derricks used on barges, pontoons, vessels or other means of flotation, the employer must ensure that:

(1) The rated capacity of the equipment (including but not limited to modification of load charts) applicable for use on land is reduced to:

(i) Account for increased loading from list, trim, wave action, and wind.

(ii) Be applicable to a specified location(s) on the specific barge, pontoons, vessel or other means of flotation that will be used, under the environmental conditions expected and encountered.

(iii) The conditions required in paragraphs (n)(3) and (n)(4) of this section are met.

(2) The rated capacity modification required in paragraph (n)(1) of this section is performed by the equipment manufacturer, or a qualified person who has expertise with respect to both land crane/derrick capacity and the stability of vessels/flotation devices.

(3) For list and trim.

(i) The maximum allowable list and the maximum allowable trim for the barge, pontoon, vessel or other means of flotation must not exceed the amount necessary to ensure that the conditions in paragraph (n)(4) of this section are met. I n addition, the maximum allowable list and the maximum allowable trim does not exceed the least of the following: 5 degrees, the amount specified by the crane/derrick manufacturer, or, when, an amount is not so specified, the amount specified by the qualified person.

(ii) The maximum allowable list and the maximum allowable trim for the land crane/derrick does not exceed the amount specified by the crane/derrick manufacturer, or, when, an amount is not so specified, the amount specified by the qualified person.

(4) For the following conditions:

(i) All deck surfaces of the barge, pontoons, vessel or other means of flotation used are above water.

(ii) The entire bottom area of the barge, pontoons, vessel or other means of flotation used is submerged.

(5) Physical attachment, corralling, rails system and centerline cable system meet the requirements in Option (1), Option (2), Option (3), or Option (4) of this section, and that whichever option is used also meets the requirements of paragraph (n)(5)(v) of this section.

(i) *Option (1) – Physical attachment.* The crane/derrick is physically attached to the barge, pontoons, vessel or other means of flotation. Methods of physical attachment include crossed-cable systems attached to the crane/derrick and vessel/flotation device, bolting or welding the crane/derrick to the vessel/flotation device, strapping the crane/derrick to the vessel/flotation device with chains, or other methods of physical attachment.

(ii) *Option (2) – Corralling.* The crane/derrick is prevented from shifting by installing barricade restraints (i.e., a corralling system). Employers must ensure that corralling systems do not allow the equipment to shift by any amount of shifting in any direction.

(iii) *Option (3) – Rails.* The crane/derrick must be prevented from shifting by being mounted on a rail system. Employers must ensure that rail clamps and rail stops are used unless the system is designed to prevent movement during operation by other means.

(iv) *Option (4) – Centerline cable system.* The crane/derrick is prevented from shifting by being mounted to a wire rope system. The employer must ensure that the wire rope system meets the following requirements:

- **(A)** The wire rope and attachments are of sufficient size and strength to support the side load of crane/derrick.
- **(B)** The wire rope is attached physically to the vessel/flotation device.
- **(C)** The wire rope is attached to the crane/derrick by appropriate attachment methods (such as shackles or sheaves) on the undercarriage, and that the method used will allow the crew to secure the crane/derrick from movement during operation and to move the crane/derrick longitudinally along the vessel/flotation device for repositioning.
- **(D)** Means are installed to prevent the crane/derrick from passing the forward or aft end of the wire rope attachments.
- **(E)** The crane/derrick is secured from movement during operation.

(v) The systems/means used to comply with Option (1), Option (2), Option (3), or Option (4) of this section are designed by a marine engineer, registered professional engineer familiar with floating crane/derrick design, or qualified person familiar with floating crane/derrick design.

(6) *Exception.* For mobile auxiliary cranes used on the deck of a floating crane/derrick, the requirement specified by paragraph (n)(5) of this section to use Option (1), Option (2), Option (3), or Option (4) does not apply when the employer demonstrates implementation of a plan and procedures that meet the following requirements:

(i) A marine engineer or registered professional engineer familiar with floating crane/derrick design develops and signs a written plan for the use of the mobile auxiliary crane.

(ii) The plan is designed so that the applicable requirements of this section are met despite the position, travel, operation, and lack of physical attachment (or corralling, use of rails or cable system) of the mobile auxiliary crane.

(iii) The plan specifies the areas of the deck where the mobile auxiliary crane is permitted to be positioned, travel, and operate, and the parameters and limitations of such movements and operation.

(iv) The deck is marked to identify the permitted areas for positioning, travel, and operation.

(v) The plan specifies the dynamic and environmental conditions that must be present for use of the plan.

(vi) If the dynamic and environmental conditions this section are exceeded, the mobile auxiliary crane is attached physically or corralled in accordance with Option (1), Option (2) or Option (4) of paragraph (n)(5) of this section.

(7) The barge, pontoons, vessel or other means of flotation used:

(i) Are structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick's maximum rated capacity with all anticipated deck loads and ballasted compartments.

(ii) Have a subdivided hull with one or more longitudinal watertight bulkheads for reducing the free surface effect.

(iii) Have access to void compartments to allow for inspection and pumping.

SUBPART O - OVERHEAD & GANTRY CRANES 1926.1438

Permanently Installed Overhead and Gantry Cranes

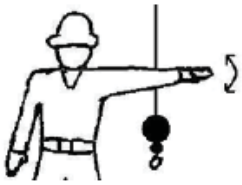
The requirements of § 1910.179, except for § 1910.179(b)(1), and not the requirements of this subpart CC, apply to the following equipment when used in construction and permanently installed in a facility: overhead and gantry cranes, including semi-gantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics.

The rated load of the crane shall be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block and this marking shall be clearly legible from the ground or floor.

Revision Date: 08-18-15

Approved By: Safety Committee 3-24-11

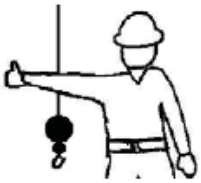
CONSTRUCTION CRANES



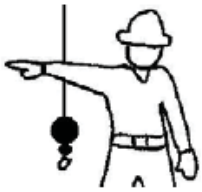
STOP – With arm extended horizontally to the side, palm down, arm is swung back and forth.

EMERGENCY STOP – With both arms extended horizontally to the side, palms down, arms are swung back and forth.

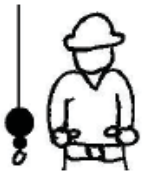
HOIST – With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.



RAISE BOOM – With arm extended horizontally to the side, thumb points up with other fingers closed.

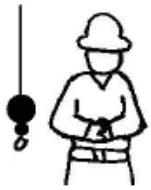


SWING – With arm extended horizontally, index finger points in direction that boom is to swing.

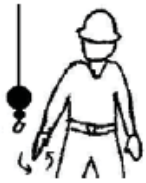


RETRACT TELESCOPING BOOM – With hands to the front at waist level, thumbs point at each other with other fingers closed.

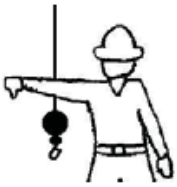
RAISE THE BOOM AND LOWER THE LOAD – With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.



DOG EVERYTHING – Hands held together at waist level.

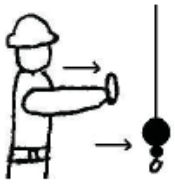


LOWER – With arm and index finger pointing down, hand and finger make small circles.

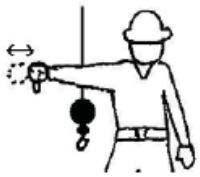


LOWER BOOM – With arm extended horizontally to the side, thumb points down with other fingers closed.

EXTEND TELESCOPING BOOM – With hands to the front at waist level, thumbs point outward with other fingers closed.



TRAVEL/TOWER TRAVEL – With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.



LOWER THE BOOM AND RAISE THE LOAD – With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.

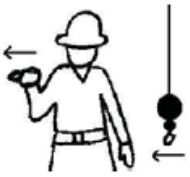
MOVE SLOWLY – A hand is placed in front of the hand that is giving the action signal.

USE AUXILIARY HOIST (whipline) – With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.

CRAWLER CRANE TRAVEL, BOTH TRACKS – Rotate fists around each other in front of body; direction of rotation away from body indicates travel forward; rotation towards body indicates travel backward.

USE MAIN HOIST – A hand taps on top of the head. Then regular signal is given to indicate desired action.

CRAWLER CRANE TRAVEL, ONE TRACK – Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.



TROLLEY TRAVEL – With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.