Industrial Performance Services

Industrial Tubular Catalyst Services

CONSTRUCTION CRANES PROCEDURE

V:2023.1

Construction Cranes Procedure

January 2023

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Purpose

Overhead cranes, hoists, and rigging equipment are used by IPS★ITCS employees for lifting and moving materials. In order to maintain a safe workplace for its employees and comply with new regulations, only qualified individuals shall operate these devices. This program outlines the procedures for safe operations and the training requirements regarding overhead cranes, hoists and rigging equipment.

Scope

Applies to all IPS★ITCS employees who operate overhead cranes, hoists, and rigging equipment in the scope of their job duties and assignments. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers IPS★ITCS employees and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

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.

Attachments means 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 floats.

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.

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.

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).

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 means instructions, recommendations, limitations and specifications.

Fall protection equipment means guardrail systems, safety net systems, 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 rope 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.

For example means “one example, although there are others.”

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.

Include/including means “including, but not limited to.”

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 worksite means a construction worksite 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 workstation.

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.

Paragraph refers to a paragraph in the same section of this subpart that the word “paragraph” is used, unless otherwise specified.

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 include, 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 they are 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.

Section means a section of this subpart, unless otherwise specified.

Sideboom 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 means 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.

Such as means “such as, but not limited to.”

Superstructure: See Upperworks.

Tagline means a rope (usually fiber) attached to a lifted load for purposes of controlling load spinning and pendular 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 means procedures that are no longer available from the manufacturer, or have never been available, from the manufacturer.

Upper structure: See Upperworks.

Upperworks 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.

Up to means "up to and including."

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.

What is Not Defined as a Crane

- Forklifts, Track Loaders, Excavators (Track Hoe/Backhoe), Concrete Pump Trucks w/boom
- Power Shovels, Digger Derricks, Tow Trucks, Vehicle Mounted Work Platforms
- Self-propelled Elevating Work Platforms, Stacker Cranes, Mechanic's Trucks With Hoisting Devices
- Come-A-Longs and Chain Falls, Gin Poles For Communication Tower Work
- Tree Trimming and tree removal work
- Anchor handling with a vessel or barge using an affixed A-frame

Key Responsibilities

Managers and Supervisors

- Are responsible to ensure that employees and contractors are trained and qualified on the proper operations and have been trained in crane and hoist safety.
- Shall ensure modifications or additions that may affect the capacity or safe operation of the equipment must not be made without written approval from the manufacturer or approval from a registered professional engineer. The manufacturer must approve all modifications/additions in writing. A registered professional engineer must be qualified with respect to the equipment involved and must ensure the original safety factor of the equipment is not reduced.
- Shall ensure all manufacturer procedures applicable to the operational function of equipment must be complied with. All manufacturer procedures applicable to the operational functions of equipment, including its use with attachments, must be complied with.
- Are responsible to see that all provisions of this program are followed and that crane inspections are performed and the equipment is in safe operating condition.

- Are responsible for identifying hazard areas by marking the boundaries of the crane swing radius with warning lines, railings or similar barriers or other safety measures to be used when the equipment has the potential to strike and injure an employee or pinch/crush an employee against any other object.

Employees

- Employee operators are responsible to follow the requirements of this program and report any damage or needed repairs immediately to their supervisor.
- Operators must meet the physical qualifications, pass a physical, a written examination, understand and be able to use a load chart as well as calculate loads for the crane type operated.
- Employees designated as crane operators are responsible for the entire lift. In addition, crane operators are responsible to:

    - Make the required inspections,
    - Ensure that the crane is maintained,
    - Ensure that all personnel working in the area around the crane are kept clear of all hazards related to crane operations.
    - Determine the weights, and correct rigging required for loads to be lifted.

Crane Operator Certification/Qualification

Operators must be determined to be qualified before they are permitted to operate any crane. Only those employees qualified by training or experience shall be allowed to operate equipment and machinery.

Within 4-years of November 8th, 2020, IPS★ITCS must ensure operators must be qualified/certified by one of the following methods:

Certification by an Accredited Crane Operator Testing Organization

- Accredited by a nationally recognized accrediting agency
- Certification is portable
- Valid for five years
- Program must be reviewed by a nationally recognized accrediting agency every three years

Qualification by an Audited Employer Program

- Developed or approved by an auditor certified by an accredited crane operator testing organization
- Auditor is not an employee of IPS★ITCS
- Tests should be administered per nationally recognized test administration standards
- Program shall be audited within the first three months, then once every three years
- Qualification is not portable and valid for five years

Qualification by the U.S. Military

Licensing by a Government Entity

- Must meet or exceed requirements of the OSHA standard
- Valid only within the jurisdiction of the government entity
- Valid for time specified by the government entity, but no longer than five years

Certification/Qualification Criteria

Pass written test that include:

- Controls and operational performance
- Ability to calculate the load/capacity
- Procedures for power line contact
- Site preparation
- Ability to read manuals/charts relevant to the equipment being operated

Pass practical examination

Ability to perform a pre-shift inspection

Operational and maneuvering skills

Application of load chart information

Application of safe shut down and securing procedures

Administrative Criteria

- IPS★ITCS must revoke operator's certification if they have reason to believe the employee is not qualified to operate.
- The current training records must be on file during the operator's employment.

Rigger Qualifications

Riggers assemble, rig, hook and unhook, guide, and disassemble crane equipment and materials. Riggers must meet the requirements of a qualified person. A qualified rigger is a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, successfully demonstrates the ability to resolve problems relating to the subject matter, the work, or the project.

Riggers must be trained in all the requirements of the regulations that apply to their respective roles. For example, riggers must be trained and qualified to perform assembly and disassembly operations when their job tasks require them to perform such operations.

Signal Person Qualification

All signal persons must be qualified to give signals. In order to be qualified, the signal person must:

- 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.
- Be competent in the application of the type of signals used.

- 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.
- Know and understand the regulatory requirements for signals (29 CFR 1926.1419 to 1926.1422) and the signal person qualifications (29 CFR 1926.1428).
- Demonstrate that they meet the qualification requirements for signalers through an oral or written test and through a practical test.

Signal Person Evaluations

The qualification of signal persons must be evaluated and documented by either:

- A third-party qualified evaluator, *or*
- The employer's qualified evaluator (i.e., an employee competent in accurately assessing whether the signaler has met the qualification requirements)

Signal Person Refresher Training

If subsequent actions by the signal person indicate that the individual does not meet the Qualification Requirements, IPS★ITCS must not allow the individual to continue working as a signal person until retraining is provided and a reassessment is made that confirms that the individual meets the Qualification Requirements.

Documentation of Signaler Qualification

IPS★ITCS must make the documentation for whichever option is used available at the site while the signal person is employed by IPS★ITCS. The documentation must specify each type of signaling (e.g., hand signals, radio signals) for which the signal person meets the requirements of the rule.

Authority to Stop Operations

The operator has the authority to stop and refuse to handle loads whenever there is a safety concern. Whenever there is a safety concern, the operator must have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

Ground Conditions

Cranes must not be used unless ground conditions are able to support the equipment and any supporting materials per the manufacturer's specifications. IPS★ITCS (controlling entity) will ensure that equipment must not be assembled or used 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.

IPS★ITCS will locate all hazards that are identified in all available documents and inform the crane user of them.

Overhead Power Lines in Crane Operations

- No part of crane, line or load may be able to reach within 20 feet of a power line during setup. Exceptions: de-energized and grounded power lines or use of a dedicated spotter or proximity alarms.
- Assembly/disassembly below power lines is prohibited, unless line is de-energized and grounded.
- All power lines are presumed to be energized unless confirmed to be de-energized by the utility owner/operator and visibly grounded at the worksite.
- All power lines presumed to be un-insulated.
- Employees shall understand limitations of insulating links, proximity alarms and range control devices, if used.
- Dedicated spotters shall be trained.
- There must be at least one electrocution hazard warning sticker conspicuously placed in the cab of the crane.

Power Lines

A pre-operation hazard assessment will be performed to identify the work zone and determine if any part of the equipment could reach closer than 20 feet to a power line. 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 a power line.

Measures must be taken if it is determined that any part of the equipment, load line or load could get closer than 20 feet to a power line. If it is determined that any part of the equipment, load line or load 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 deenergized and visibly grounded
- Ensure no part of the equipment, load line or load gets closer than 20 feet to the power line
- Determine the line's voltage and minimum approach distance permitted in Table A (below).

Voltage (kV)	Minimum Clearance Distance(feet)
Up to 50	10
50 to 200	15
200 to 350	20
350 to 500	25
500 to 750	35
750 to 1000	45
Over 1000	As established by the line owner

Some special requirements for working below power lines include training of operators and crew on:

- Procedures to follow after power line contact
- Danger of a potential energized zone
- Operator’s emergency procedures
- Safest means to evacuate equipment
- Need for employees to avoid approach
- Safe clearance from power lines

Required Equipment

Mandatory Safety Devices Equipment

All safety devices must be in proper working order before operation begins. Safety devices are required to be on all equipment and must be in proper working order before operations begin. If any of the devices are not in proper working order the equipment must be taken out of service and operations must not resume until the device is working properly again. The following is mandatory equipment:

- Crane level indicator
- Boom stops
- Jib stops

- Locks for foot pedal brakes
- Horns
- Integral check valves for hydraulic outriggers
- Rail clamps and stops for equipment on rails

The following required equipment must be in service except where specified temporary alternative measures are met:

- Boom hoist limiting device
- Luffing jib limiting device
- Anti-two-block device (cranes manufactured after 2/28/92) Exception: lattice booms used for dragline, clam shell, scrap magnet, drop ball, marine operations and pile driving work
- Boom angle or radius indicator
- Jib angle indicator (luffing jibs)
- Boom length indicator (telescopic booms)
- Load weighing devices (load moment indicators, rated capacity indicators or rated capacity limiters –cranes manufactured after 3/29/03
- Outrigger position indicators (cranes manufactured after 1/1/08)
- Hoist drum rotation indicator (if drum is not visible to operator)

An accessible fire extinguisher of 5BC rating, or higher, shall be available at all operator stations or cabs of equipment.

Procedures applicable to the operation of the equipment must be readily available in the cab at all times. The operator shall have access to procedures applicable to the operation of the equipment. Procedures include rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions, and operator's manual.

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 floor.

Whenever internal combustion engine powered equipment exhausts in enclosed spaces, test shall be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres.

Material Hoists, Personnel Hoists and Elevators

General Requirements

Hoist Specifications
All material hoists must conform to the requirements of ANSI/ASME A10.5-1969, Safety Requirements for Material Hoists. Note: ANSI/ASME have updated this standard; however, OSHA allows IPS★ITCS to follow the updated consensus standard without penalty when it provides equal or greater employee protection.

IPS★ITCS must comply with the manufacturer's specifications and limitations for the operation of all hoists and elevators. Where manufacturer's specifications are not available, a

professional engineer competent in the field must determine the limitations assigned to the equipment.

Rated load capacities, recommended operating speeds, and special hazard warnings or instructions must be posted on cars and platforms.

Wire Rope
Hoisting ropes must be installed in accordance with the wire rope manufacturer's recommendations. Wire rope must be removed from service when any of the following conditions exists:

- In hoisting ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay
- Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third of the original diameter of the outside wires
- Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires
- Reduction from nominal diameter of more than three sixty-fourths in. for diameters up to and including three-fourths in.; one-sixteenth in. for diameters seven-eighths to 11/8.in.; and three thirty-seconds in. for diameters one and one-quarter in. to one and one-half.in.

Prohibited Operations
The installation of live booms on hoists and the use of endless belt-type man lifts are prohibited.

The manufacturer's instructions, procedures and prohibitions must be followed and complied with when assembling and/or disassembling equipment.

Material Hoists
Operating rules must be established and posted at the operator's station of the hoist. Such rules must include signal system and allowable line speed for various loads. Rules and notices must be posted on the car frame or crosshead in a conspicuous location, including the statement "No Riders Allowed." No person must be allowed to ride on material hoists except for the purposes of inspection and maintenance.

Protective Gates, Bars, and Coverings
All entrances of the hoistways must be protected by substantial gates or bars, which must guard the full width of the landing entrance. All hoistway entrance bars and gates must be painted with diagonal contrasting colors, such as black and yellow stripes.

Bars must be not less than 2- by 4-in. wooden bars or the equivalent, located 2 ft. from the hoistway line. Bars must be located neither less than 36 in. nor more than 42 in. above the floor. Gates or bars protecting the entrances to hoistways must be equipped with a latching device.

Overhead protective covering of 2-in. planking, 3/4-inch plywood, or other solid material of equivalent strength must be provided on the top of every material hoist cage or platform.

The operator's station of a hoisting machine must be provided with overhead protection equivalent to tight planking not less than 2 in. thick. The support for the overhead protection must be of equal strength.

Hoist Towers
All material hoist towers must be designed by a licensed professional engineer. Hoist towers may be used with or without an enclosure on all sides. Whichever alternative is chosen, the following applicable conditions must be met:

- When a hoist tower is enclosed, it must be enclosed on all sides for its entire height with a screen enclosure of 1/2-in. mesh, No. 18 U.S. gauge wire or equivalent, except for landing access.
- When a hoist tower is not enclosed, the hoist platform or car must be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with 1/2-in. mesh of No. 14 U.S. gauge wire or equivalent. The hoist platform enclosure must include the required gates for loading and unloading. A 6-ft-high enclosure must be provided on the unused sides of the hoist tower at ground level.

Car-arresting devices must be installed to function in case of rope failure.

Personnel Hoists

Specifications
All personnel hoists used by employees must be constructed of materials and components that meet the specifications for materials, construction, safety devices, assembly, and structural integrity as stated in the ANSI/ASME A10.4-1963, Safety Requirements for Workmen's Hoists. ANSI/ASME have updated this standard; however, OSHA allows IPS★ITCS to follow the updated consensus standard without penalty when it provides equal or greater employee protection.

Hoist Towers
Hoist towers outside the structure must be enclosed for the full height on the side or sides used for entrance and exit to the structure. At the lowest landing, the enclosure on the sides not used for exit or entrance to the structure must be enclosed to a height of at least 10 ft. Other sides of the tower adjacent to floors or scaffold platforms must be enclosed to a height of 10 ft. above the level of such floors or scaffolds. Towers inside of structures must be enclosed on all four sides throughout the full height. Towers must be anchored to the structure at intervals not exceeding 25 ft. In addition to tie-ins, a series of guys must be installed. Where tie-ins are not practical, the tower must be anchored by means of guys made of wire rope at least one-half in. in diameter, securely fastened to anchorage to ensure stability.

Hoistway Doors and Gates
Hoistway doors or gates must be not less than 6 ft. 6 in. high and must be provided with mechanical locks that cannot be operated from the landing side, and must be accessible only to persons on the car. A door or gate must be provided at each entrance to the car, which must protect the full width and height of the car entrance. Doors or gates must be provided with electrical contacts that do not allow movement of the hoist when door or gate is open.

Cars
Cars must be permanently enclosed on all sides and the top, except sides used for entrance and exit that have car gates or doors. Safeties must be capable of stopping and holding the car and rated load when traveling at governor tripping speed. Cars must be provided with a

capacity and data plate secured in a conspicuous place on the car or crosshead. An emergency stop switch must be provided in the car and marked "Stop."

Covering
Overhead protective covering of 2-in. planking, 3/4-in. plywood, or other solid material or equivalent strength must be provided on the top of every personnel hoist.

Engine Prohibition
Internal combustion engines must not be permitted for direct drive.

Stopping Device
Normal and final terminal stopping devices must be provided.

Ropes
The minimum number of hoisting ropes used must be three for traction hoists and two for drum-type hoists. The minimum diameter of hoisting and counterweight wire ropes must be1/2 in. Following are the minimum safety factors for suspension wire ropes:

Rope speed (feet per minute)	Minimum factor of safety
50	7.60
75	7.75
100	7.95
125	8.10
150	8.25
600	10.70

See the chart at 29 CFR 1926.552(c)(14) for additional safety factors.

Personnel Hoists Used in Bridge Tower Construction
Such hoists must be approved by a registered professional engineer and erected under the supervision of a qualified engineer competent in this field.

When a hoist tower is not enclosed, the hoist platform or car must be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with 3/4-in. mesh of No. 14 U.S. gauge wire or equivalent. The hoist platform enclosure must include the required gates for loading and unloading.

These hoists must be inspected and maintained on a weekly basis. Whenever the hoisting equipment is exposed to winds exceeding 35 miles per hour, it must be inspected and put in operable condition before reuse.

Wire rope must be taken out of service when any of the following conditions exist:

- In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay
- Wear of one-third the original diameter of outside individual wires
- Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure
- Evidence of any heat damage from any cause

- Reductions from nominal diameter of more than three sixty-fourths in. for diameters to and including three-fourths in., one-sixteenth in. for diameters seven-eights in. to 11/8 in. inclusive, three thirty-seconds in. for diameters 11/4 to 11/2 in. inclusive
- In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

Elevators

Permanent elevators under the care and custody of IPS★ITCS and used by employees for work covered by this Act must comply with the requirements of ANSI/ASME A17.1-1965 with addenda A17.1a-1967, A17.1b-1968, A17.1c-1969, A17.1d-1970, and inspected in accordance with A17.2-1960 with addenda A17.2a-1965 and A17.2b-1967. ANSI/ASME have updated these standards; however, OSHA allows IPS★ITCS to follow the updated consensus standards without penalty when they provide equal or greater employee protection.

Base-Mounted Dum Hoists

Specifications

All base-mounted drum hoists in use must meet the applicable requirements for design, construction, installation, testing, inspection, maintenance, and operations, as prescribed by the manufacturer.

IPS★ITCS must ensure that exposed moving parts such as gears, projecting screws, setscrews, chain, cables, chain sprockets, and reciprocating or rotating parts that constitute a hazard are guarded.

All controls used during the normal operation cycle must be located within easy reach of the operator's station.

Electric Motor-Operated Hoists

Electric motor-operated hoists must be provided with:

- A device to disconnect all motors from the line upon power failure and not permit any motor to be restarted until the controller handle is brought to the "off" position
- Where applicable, an over-speed preventive device
- A means whereby remotely operated hoists stop when any control is ineffective

Overhead Hoists

All overhead hoists in use must meet the applicable requirements for construction, design, installation, testing, inspection, maintenance, and operation, as prescribed by the manufacturer.

The safe working load of the overhead hoist, as determined by the manufacturer, must be indicated on the hoist, and this safe working load must not be exceeded.

The supporting structure to which the hoist is attached must have a safe working load equal to that of the hoist. The support must be arranged so as to provide for free movement of the hoist and must not restrict the hoist from lining itself up with the load.

The hoist must be installed only in locations that will permit the operator to stand clear of the load at all times.

Air hoists must be connected to an air supply of sufficient capacity and pressure to safely operate the hoist. All air hoses supplying air must be positively connected to prevent disconnected during use.

Conveyors

Specifications

All conveyors in use must meet the applicable requirements for design, construction, inspection, testing, maintenance, and operation, as prescribed in the ANSI/ASME B20.1-1957, Safety Code for Conveyors, Cableways, and Related Equipment. ANSI/ASME have updated this standard; however, OSHA allows IPS★ITCS to follow updated consensus standards without penalty when they provide equal or greater employee protection.

Means for stopping the motor or engine must be provided at the operator's station. Conveyor systems must be equipped with an audible warning signal to be sounded immediately before starting up the conveyor. If the operator's station is at a remote point, similar provisions for stopping the motor or engine must be provided at the motor or engine location.

Emergency stop switches must be arranged so that the conveyor cannot be started again until the actuating stop switch has been reset to running or "on" position.

Guards

Screw conveyors must be guarded to prevent employee contact with turning flights. Where a conveyor passes over work areas, aisles, or thoroughfares, suitable guards must be provided to protect employees required to work below the conveyors.

Marking and Lockout/Tagout

All crossovers, aisles, and passageways must be conspicuously marked by suitable signs (see 29 CFR 1926.200). Conveyors must be locked out, or otherwise rendered inoperable, and tagged out with a "Do Not Operate" tag during repairs and when operation is hazardous to employees performing maintenance work.

Rigging Practices

Major incidents involving rigging operations are caused by:

- the failure of equipment from overloading, incorrect assembly or disassembly, or lack of proper maintenance;
- dropped or falling loads, usually as a result of the misuse or malfunction of hoisting lines and rigging; and

- lack of safeguards, especially in proximity to high-voltage lines. Training is key in minimizing the risk of incidents

An important element of the IPS★ITCS material handling program is proper rigging practices. Rigging of loads must be done with relative precision and performed by trained, experienced personnel. To ensure that safe practices are followed, a competent and qualified person must direct the assembly/disassembly of equipment. The assembly/disassembly of equipment must be directed by a competent and qualified person to see that:

- Rigging equipment that has the necessary capacity to do the job is available.
- Rigging equipment is in a safe working condition.
- Loads are rigged correctly.
- Safety of the rigging crew and other potentially exposed personnel is maintained.

Rigging and Sling Inspections and Safety Requirements

- Only select rigging equipment that is in good condition.
- All rigging equipment shall be inspected annually; defective equipment is to be removed from service and destroyed to prevent inadvertent reuse.
- The load capacity limits shall be stamped or affixed to all rigging components.
- All devices shall be visually inspected prior to use and removed from service for any of the following conditions:
    - Nylon slings with:
        - Abnormal wear.
        - Torn stitching.
        - Broken or cut fibers.
        - Discoloration or deterioration.
    - Wire rope slings (see Wire Rope Inspection) with:
        - Kinking, crushing, bird caging, or other distortions.
        - Evidence of heat damage.
        - Cracks, deformation, or worn end attachments.
        - Six randomly broken wires in a single rope lay.
        - Three broken wires in one strand of rope.
        - Hooks opened more than 15% at the throat.
        - Hooks twisted sideways more than 10 degrees from the plane of the unbent hook.
    - Alloy steel chain slings with:
        - Cracked, bent, or elongated links or components.
        - Cracked hooks.
        - Shackles, eye bolts, turnbuckles, or other components that are damaged or deformed.

Rigging a Load

- Determine the weight of the load - do not guess.

- Determine the proper size for slings and components.
- Do not use manila rope for rigging.
- Ensure that shackle pins and shouldered eyebolts are installed in accordance with the manufacturer's recommendations.
- Ensure that ordinary (shoulderless) eyebolts are threaded in at least 1.5 times the bolt diameter.
- Use safety hoist rings (swivel eyes) as a preferred substitute for eye bolts wherever possible.
- Pad sharp edges to protect slings.
- Remember that machinery foundations or angle-iron edges may not feel sharp to the touch but could cut into rigging when under several tons of load.
- Wood, tire rubber, or other pliable materials may be suitable for padding.
- Do not use slings, eyebolts, shackles, or hooks that have been cut, welded, or brazed.
- Install wire-rope clips with the base only on the live end and the U-bolt only on the dead end.
- Follow the manufacturer's recommendations for the spacing for each specific wire size.
- Determine the center of gravity and balance the load before moving it.
- Initially lift the load only a few inches to test the rigging and balance.

Inspections

Following assembly and erection of hoists, and before being put in service, an inspection and test of all functions and safety devices must be made under the supervision of a competent person.

A similar inspection and test are required following major alteration of an existing installation.

All hoists must be inspected and tested at not more than 3-month intervals. IPS★ITCS must prepare a certification record, which includes the date the inspection and test of all functions and safety devices was performed; the signature of the person who performed the inspection and test; and a serial number, or other identifier, for the hoist that was inspected and tested. The most recent certification record must be maintained on file.

Cranes shall be inspected on the following schedule:

- After Modification
- After Repair Or Adjustment
- Post Assembly
- Each Shift
- Monthly
- Annual Comprehensive

Additional inspections will occur for the following situations:

<u>Severe Service</u>

- Shock load, corrosive atmosphere, etc.
- Inspect exposed items/conditions
- Document

Not In Regular Use

- Idle more than three months
- Monthly inspection must be performed
- Document

Cranes and hoists that have been overloaded shall be inspected prior to being returned to service. The inspection and testing requirements are included.

Initial inspection and test shall be performed by a qualified third party.

- Prior to initial use all new and altered cranes shall be inspected and tested to ensure compliance with the provisions of 29 CFR1910.179 and ABSI B30.2.
- Only after determining, by this inspection, testing and proper documentation, that the crane is in safe operating condition, shall it be put into service.

IPS★ITCS shall designate a competent person who shall inspect all machinery and equipment prior to each use, and during use, to make sure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use. Daily pre-use inspections shall be performed by the crane operator (designated as IPS★ITCS's designated competent person) prior to beginning shift and through observation during normal operation. Daily inspections shall include:

- Any deficiencies shall be repaired, or defective parts replaced, before continued use.
- All functional operating mechanisms for maladjustment interfering with proper operation.
- Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems.
- Hooks, if deformations or cracks are found the hook shall be tagged out of service until repaired and tested by qualified personnel.
- Hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations.

Severe Service Inspection

Severe service inspections shall be conducted to inspect exposed items and conditions resulting from a shock load, corrosive atmosphere, etc. Inspections shall be documented.

Not in Regular Use Inspection

If equipment is idle for more than three months a monthly inspection shall be performed before being placed in service. The same criteria for monthly inspections shall be followed.

Monthly Inspection

Monthly inspections of equipment by a competent person are documented. Equipment must be inspected monthly by a competent person and documented. Documentation must include the following:

- Items checked,
- Results of inspection, and
- Name and signature of the inspector.

Documentation must be retained for 3 months. Documented monthly inspection not required if the daily inspection is documented and records are retained for 3 months.

If safety hazards are found during inspections, the equipment in question shall be tagged out and not used until repairs are made. Any deficiencies constituting a safety hazard shall cause the equipment to be tagged out of service until repairs are made.

Annual Inspection
A thorough, annual inspection and functioning testing of the hoisting machinery shall be documented made by a qualified person, or by a government or private agency recognized by the U.S. Department of Labor using the detail inspection criteria per regulation. IPS★ITCS shall maintain a record of the dates and results of inspections for each hoisting machine and piece of equipment and kept on file for 12 months or until the next annual inspection.

Wire Rope Inspection
Wire rope will be inspected on the following schedule:

- Shift Inspection – Before each shift.
- Monthly Inspection - All wire ropes, including running ropes and the inspection shall be documented.
- Annual Inspection – At least every 12 months, unless not feasible due to set up. This will be a more detailed inspection including wire rope that is normally hidden during daily or monthly inspections and the inspection shall be documented.

A IPS★ITCS competent person will conduct visual inspections before each shift, monthly and annually for wire rope and categorize deficiencies in:

<u>Category I Deficiencies</u>

- Significant distortion of the wire rope structure such as kinking, crushing, un-stranding, bird caging, signs of core failure, or steel core protrusion between the outer strands.
- Significant corrosion.
- Electric arc (from a source other than power lines) or heat damage.
- Improperly applied end connections.
- Significantly corroded, cracked, bent, or worn end connections (such as from severe service).

If a Category I deficiency is identified, an immediate determination shall be made by the qualified person as to replacement of the wire rope, or if the deficiency is localized, the wire rope may be severed at the bad spot and may be continued to be used.

<u>Category II Deficiencies</u>

Visible broken wires as follows:

- In running wire ropes: six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay.
- In rotation resistant ropes: two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in 30 rope diameters.

- In pendants or standing wire rope more than two broken wires in one rope lay located in rope beyond end connections and / or one or more broken wire in a rope lay located at an end connection.

If a category II deficiency is identified an immediate determination shall be made by the qualified person as to, based on manufacturer recommendations, either remove or monitor the wire rope for continued deterioration.

The qualified person determines when to replace the wire rope (no more than 30 days after the deficiency is identified).

A qualified person assesses the deficiency in light of the load and other conditions of use and determines it is safe for continued use.

A qualified person establishes the parameters of use.

All workers who conduct shift inspections are notified.

The qualified person's findings and procedures are documented.

Category III Deficiencies

- Electrical contact to power line
- Core protrusion or other distortion indicating core failure in rotation resistant wire rope
- Broken strand

If a category III deficiency is identified, operations involving use of the wire rope shall be prohibited until the:

- Wire rope is replaced (ALWAYS with power line contact).
- Deficiency is localized and problem corrected.

Operational Procedures
Only qualified personnel shall operate cranes and equipment covered by this program. Operators shall comply with the following safety rules while operating cranes and hoists:

- Employees shall not be exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres when internal combustion engine powered equipment is used. Tests shall be conducted and documented.
- Do not engage in any practice that will divert your attention while operating the crane.
- Respond to signals only from the person who is directing the lift or any appointed signal person.
- Obey a stop signal at all times, no matter who gives it.
- Do not move a load over people.
- People shall not be placed in jeopardy by being under a suspended load.
- Do not work under a suspended load unless the load is supported by blocks, jacks, or a solid footing that will safely support the entire weight.
- Have a crane or hoist operator remain at the controls or lock open and tag the main electrical disconnect switch.
- Ensure that the rated load capacity of a crane's bridge, individual hoist, or any sling or fitting is not exceeded.
- Know the weight of the object being lifted.

- Check that all controls are in the OFF position before closing the main line disconnect switch.
- If spring-loaded reels are provided to lift pendants clear off the work area, ease the pendant up into the stop to prevent damaging the wire.
- Avoid side pulls. These can cause the hoist rope to slip out of the drum groove, damaging the rope or destabilizing the crane or hoist.
- To prevent shock loading, avoid sudden stops or starts. Shock loading can occur when a suspended load is accelerated or decelerated, and can overload the crane or hoist. When completing an upward or downward motion, ease the load slowly to a stop.

A visual inspection of the equipment will be conducted by a competent person prior to each shift. A competent person must conduct a visual inspection of equipment prior to each shift. The inspection must consist of observation for apparent deficiencies. Some of the inspection items include control mechanisms, pressurized lines, hooks and latches, wire rope, electrical apparatus, tires (when used), and ground conditions. The designated competent person operator shall do the following steps before making lifts with any crane or hoist:

- Test the upper-limit switch and slowly raise the unloaded hook block until the limit switch trips.
- Visually inspect the hook, load lines, trolley, and bridge as much as possible from the operator's station; in most instances, this will be the floor of the building.
- If provided, test the lower-limit switch.
- Test all direction and speed controls for both bridge and trolley travel.
- Test all bridge and trolley limit switches, where provided, if operation will bring the equipment in close proximity to the limit switches

- Test the pendant emergency stop.
- Test the hoist brake to verify there is no drift without a load.
- If provided, test the bridge movement alarm.
- Lock out and tag for repair any crane or hoist that fails any of the above tests.
- Any deficiencies shall be repaired, or defective parts replaced, before continued use.

Moving a Load

- 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 area.
- 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.

Parking a Crane or Hoist

- Remove all slings and accessories from the hook.
- Return the rigging device to the designated storage racks.
- Place the emergency stop switch (or push button) in the OFF position.

Cranes or hoists shall not be loaded beyond their rated capacity for normal operations.

Any crane or hoist suspected of having been overloaded shall be removed from service by locking open and tagging the main disconnect switch. Overloaded cranes shall be inspected, repaired, load tested, and approved for use before being returned to service.

Fall Protection

Anyone conducting non-assembly/disassembly work, maintenance or repair on cranes or hoists at heights greater than 6 ft (1.8 m) shall use fall protection. Fall protection includes safety harnesses that are fitted with a lifeline and securely attached to a structural member of the crane or building. Anchorages must be any substantial part of the boom or to any substantial piece on the equipment (using correct fall protection equipment). A fall arrest system is permitted to be anchored to the crane/derrick’s hook or other part of the load line where the following requirements are met:

- A qualified person has determined the set-up and rated capacity meets or exceeds the anchorage requirements
- The operator is aware it is being used for this purpose

Exceptions to using fall protection involving non-assembly/disassembly work:

- While at a workstation or going to and from a work station.
- When walking point to point along a horizontal lattice boom that has been lowered to the ground and supported.
- In the cab or on the deck

Fall protection must be used when working over 15 feet during the assembly/disassembly process, except when the employee is:

- At or near the draw-works
- In the cab, or on the deck

Signalling

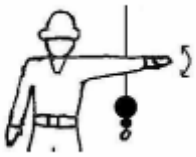
A signal person must be provided if the operator's view is obstructed, if site specific safety concerns require it or if the operator determines that it is necessary. A signal person must be provided for the following situations:

- The point of operation is not in full view of the operator
- The view is obstructed when the equipment is traveling
- The operator or the person handling the load determines it is necessary due to site specific concerns.

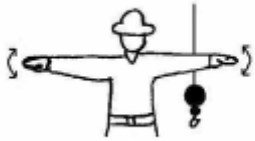
Signals to the operator shall be in accordance with the standard hand signals prescribed by the applicable ANSI standard for the type of crane in use unless voice communications equipment (telephone, radio, or equivalent) is used.

- Signalers must be qualified.
- Signals shall be discernible or audible at all times.
- Some special operations may require addition to or modification of the basic signals.
- For all such cases, these special signals shall be agreed upon and thoroughly understood by both the person giving the signals and the operator and shall not be in conflict with the standard signals.

STANDARD HAND SIGNALS



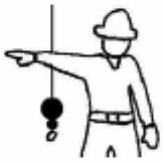
STOP – With arm extended horizontally to the side, palm down, arm is swung back and forth.



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.

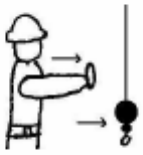
RAISE THE BOOM AND LOWER THE LOAD – With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.

DOG EVERYTHING – Hands held together at waist level.

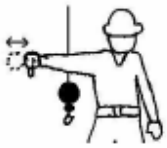
LOWER – With arm and index finger pointing down, hand and finger make small circles.

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.

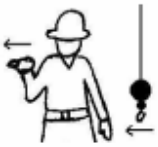
MOVE SLOWLY – A hand is placed in front of the hand that is giving the action signal.

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.

Training

Mandatory training is required for:

- Overhead power lines
- Signal persons
- Competent/qualified persons
- Operators
- Crush/pinch points
- Tag-out

Administrative Requirements

Training Costs

IPS★ITCS must provide all training required under the crane and derrick rules at no cost to the employee.

Refresher Training

IPS★ITCS must provide refresher training in relevant topics for each employee when there is an indication that retraining is necessary on the basis of IPS★ITCS actions or an evaluation of the employee's knowledge.

Training Evaluation

IPS★ITCS must evaluate each employee who has been trained in crane and derrick operations to verify that they understand the information provided in training. The rule allows IPS★ITCS to determine the most appropriate method of evaluation.

Note: The crane operator training applies only in states that do not have their own licensing and certification requirements. All other training and qualification requirements apply to all personnel.

CRANE OPERATOR TRAINING

IPS★ITCS must comply with federal requirements to train crane operators employed by them. During the certification phase-in period (i.e., November 2010 to November 2014) in states without operator licensing laws, IPS★ITCS must ensure that crane and derrick operators covered by the rules are competent to operate the equipment safely. Where an employee assigned to operate machinery does not have the required knowledge or ability to operate the equipment safely, IPS★ITCS must train that employee before operating the equipment. IPS★ITCS must ensure that each operator is evaluated to confirm that they understand the information provided in the training.

Operator-in-training requirement effective November 10, 2014

The rules for operator-in-training (e.g., prequalification/certification training, operator's trainer monitoring, multiple-lift rigging operations) in states without operator licensing rules are applicable on November 10, 2014. Until that date, operators must comply with the minimum training requirements required under the transition period from November 8, 2010 to November 10, 2014.

Minimum Training Requirements

Before operating crane equipment, each crane operator must be trained to know how to safely operate the specific type of equipment he or she will operate, including all of the following:

- Safe practices for testing the boom hoist brake on friction equipment and all other equipment with a boom (see 29 CFR 1926.1430(c)(4)(i) for the specific safe practices);
- The manufacturer's emergency procedures for stopping unintended equipment movement, where available;
- The controls and operational/performance characteristics;
- Use of, and the ability to calculate (manually or with a calculator), load and capacity information on a variety of configurations of the equipment;
- Procedures to prevent and respond to power line contact;
- Technical knowledge similar to the subject matter criteria listed in Appendix C of the regulation applicable to the specific equipment (such as general technical information

about wire ropes and rigging devices, site information, operations for carrying loads and multicrane lifts, and use of load charts);
- Technical knowledge applicable to the suitability of the supporting ground and surface to handle expected loads, to site hazards, and to site access;
- The applicable manuals, consensus standards, and other materials incorporated into the regulation.

The operator must be able to read and locate relevant information in the equipment manual and other materials containing information about the safe operation of equipment.

Operator Skills Demonstration
IPS★ITCS must ensure that the operator has demonstrated the skills necessary for safe operation of the equipment, including:

- The ability to recognize, from visual and auditory observation, the items listed in the regulation for shift inspection (29 CFR 1926.1412(d));
- Operational and maneuvering skills;
- Application of load chart information;
- Application of safe shutdown and securing procedures.

Overhead Power Line Training
In cases where crane equipment is expected to come closer to live power lines than the minimum clearance distance permitted under the rules for power line safety IPS★ITCS must train each crane operator and crew member assigned to work with equipment 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.
- 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.
- Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.
- Power lines are presumed to be uninsulated 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.
- The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.
- The procedures to be followed to properly ground equipment and the limitations of grounding.

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.

Tag Out and Start-up Procedures Training
Each operator must be trained in the tagout, and start-up procedures specified in the rule for crane and derrick equipment that is out of service (see Operation rule at 29 CFR 1926.1417(f) and (g)).

Operators of Derricks, Side-Boom Cranes and equipment with a maximum manufacturer-rated hoisting/lifting capacity of 2,000 lb. or less
Such operators are exempt from the detailed training requirements for other cranes. However, before operating such equipment, they must be trained in the safe operation of the type of equipment they will be operating.

ASSEMBLY/DISASSEMBLY (A/D) DIRECTOR

The A/D director is a person who supervises equipment assembly and disassembly operations and must understand the applicable A/D procedures.

The A/D director must meet the criteria for a competent and qualified person under the following conditions:

- Where the assembly and disassembly is performed by only one person, that person is considered the A/D director and must meet the training criteria for both a competent person and a qualified person;
- Where the A/D director is assisted by one or more qualified persons, he or she must meet the criteria for a competent person and is not required to be a qualified person.

AUTHORIZED PERSONNEL TRAINING

Each employee assigned to work on or near the equipment (i.e., authorized personnel) must be trained to:

- Recognize swing radius hazards;
- Recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure;
- Keep clear of holes and crush/pinch points.

COMPETENT PERSON TRAINING

The competent person (i.e., 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) must be trained in any additional requirements of his or her role and responsibility under the new rules. For example, a competent person assigned to conduct a visual inspection of equipment during each shift the equipment is used must be trained in the required elements of a shift inspection.

CREW MEMBER TRAINING

Assembly and Disassembly Operations

Before commencing assembly/disassembly operations, the A/D director must ensure that the crew members understand:

- Their tasks and the hazards associated with their tasks;
- The hazardous positions and locations that they need to avoid.

Work Near Power Lines
Crew members assigned to work with crane and derrick equipment must receive the same overhead power line training as required for crane operators, regardless of the distance from the power lines. See the Crane Operator Training subsection for more information.

DEDICATED SPOTTER

The dedicated spotter must meet the qualifications for a signal person and complete the training requirements for crew member.

The dedicated spotter's sole responsibility is to watch the separation between power lines and the crane or derrick 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.

MAINTENANCE AND REPAIR EMPLOYEE QUALIFICATIONS AND TRAINING

Maintenance and repair personnel must be trained to operate the equipment under limited conditions necessary to perform the maintenance or repair. The operation is limited to those functions necessary to perform maintenance, inspect the equipment or verify its performance. Such personnel may operate the equipment under the direct supervision of a qualified or certified crane operator, or if they are familiar with the operation, limitations, characteristics, and hazards associated with the type of equipment.

Qualified Person
A maintenance and repair employee must be a qualified person (i.e., a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, successfully demonstrates the ability to solve/resolve problems relating to the subject matter, the work, or the project). Maintenance and repair workers are not considered "operators" and are therefore not required to be trained in all of the areas required for crane operators.

Tagout and Start-up Procedures Training
Each maintenance and repair person must be trained in tagout, and start-up procedures specified in the rule (see Operation rule at 29 CFR 1926.1417(f) and 29 CFR 1926.1417(g)).

QUALIFIED PERSON

Qualified person is an employee by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, successfully demonstrates the ability to solve/resolve problems relating to the subject matter, the work, or

the project. Riggers and signalers are examples of personnel that must meet the requirements for qualified person.

IPS★ITCS must train each qualified person regarding the requirements of the crane and derrick regulations applicable to their respective roles.

FALL PROTECTION TRAINING

IPS★ITCS must train each employee who may be exposed to fall hazards while on or hoisted by crane equipment on all the fall protection requirements in the rule (29 CFR 1926.1423(a) to 1926.1423(j)), and the applicable criteria and practices in the fall protection rule for construction at 29 CFR 1926.502.

TRAINING RECAP TABLE

Personnel	Activity or Equipment	Training Requirement
All personnel	Work with cranes and derricks	Hazards and procedures to keep clear of holes and crush/pinch points
All personnel	Exposed to fall hazards while on or hoisted by equipment	Fall protection
All personnel on floating cranes/cranes on barges	Floating cranes/derricks and cranes/derricks on barges	Understand hazard warning signs and markings
Assembly/Disassembly (A/D) Director	Supervise assembly and disassembly operations	Meet criteria of a competent person and qualified person
Authorized personnel	Work in areas near rotating crane/derrick superstructure	How to recognize struck-by and pinch/crush hazards
Competent Person	All, including shift and monthly inspections	Applicable to respective role
Crew member	Assembly and disassembly operations	Understand tasks, hazards, positions/ areas to avoid
Crew member	Work near power lines	Power line safety information and procedures
Dedicated Spotter	Work near power lines	Qualify as a signal person
Dedicated Spotter	Work near power lines	Power line safety information and procedures
Maintenance and Repair Personnel	Operate equipment	Qualify to operate
Maintenance and Repair Personnel	Equipment out of service	Tagout and start-up procedures

Personnel	Activity or Equipment	Training Requirement
Operator	Derricks, side booms, small hoist/lift capacity cranes (2,000 lbs. or less) only	Know how to safely operate equipment (no specific training requirements)
Operator	Friction equipment	Test the boom hoist brake
Operator	Unintended equipment movement	Know manufacturer's emergency procedures
Operator	Operate specific type of crane (other than derricks, side booms, cranes of 2,000 lb or less capacity)	Know how to safely operate, inspect, calculate load, shut down, and secure
Operator	Work near power lines, and within minimum power line clearance	Power line safety and procedures in the event of electrical contact
Operator	Crane/Derrick equipment out of service	Tagout and start-up procedures
Qualified Person	All, including annual inspections	Applicable to respective role; possess a recognized degree, certificate, or professional standing, or have extensive knowledge, training, and experience.
Rigger	Assemble, rig, disassemble equipment and materials	Same as for qualified person
Signal Person	Communicate with operator of crane/derrick with greater than 2,000 lb. lift capacity	Qualify as a signal person with written or verbal test, retrain if needed
Signal Person	Communicate with operator of crane/derrick with lift capacity of 2,000 lb. or less	Proper use of signals applicable to the use of the equipment

CRANES AND DERRICKS IN CONSTRUCTION
PRE-SHIFT INSPECTION BY A COMPETENT PERSON
29 CFR 1926.1412-1413

CRANE: _____ DATE: _____
INSPECTOR: _____

Check the box next to each item after it has passed inspection. Note any deficiencies or other observations that could pose a risk of injury or property damage.

EQUIPMENT TYPE: _____ EQUIPMENT MODEL: _____

MANUFACTURER: _____ SERIAL NUMBER: _____

Circle One		Item or Function Inspected	Notes
Yes	No	Control mechanisms for maladjustments interfering with proper operation	
Yes	No	Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water, or other foreign matter	
Yes	No	Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation	
Yes	No	Hydraulic system for proper fluid level	
Yes	No	Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat	
Yes	No	Wire rope reeving for compliance with the manufacturer's specifications	
		Wire Rope Category I	
Yes	No	Significant distortion of the wire rope structure such as kinking, crushing, unstranding, birdcaging, signs of core failure or steel core protrusion between the outer strands	
Yes	No	Significant corrosion	
Yes	No	Electric arc damage (from a source other than power lines) or heat damage	
Yes	No	Improperly applied end connections	
Yes	No	Significantly corroded, cracked, bent, or worn end connections (such as from severe service).	
		Wire Rope Category II	
Yes	No	Visible broken wires, as follows:	
Yes	No	In running wire ropes: Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay, where a rope lay is the length along the rope in which one strand makes a complete revolution around the rope.	
Yes	No	In rotation resistant ropes: Two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in 30 rope diameters.	
Yes	No	In pendants or standing wire ropes: More than two broken wires in one rope lay located in rope beyond end	

Circle One		Item or Function Inspected	Notes
		connections and/or more than one broken wire in a rope lay located at an end connection	
Yes	No	A diameter reduction of more than 5% from nominal diameter.	
		Wire Rope Category III	
Yes	No	In rotation resistant wire rope, core protrusion or other distortion indicating core failure.	
Yes	No	Prior electrical contact with a power line.	
Yes	No	A broken strand.	
		Wire Rope Critical Review Items	
Yes	No	The competent person must give particular attention to all of the following:	
Yes	No	Rotation resistant wire rope in use	
Yes	No	Wire rope being used for boom hoists and luffing hoists, particularly at reverse bends.	
Yes	No	Wire rope at flange points, crossover points and repetitive pickup points on drums.	
Yes	No	Wire rope at or near terminal ends.	
Yes	No	Wire rope in contact with saddles, equalizer sheaves or other sheaves where rope travel is limited.	
Yes	No	Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation	
Yes	No	Tires (when in use) for proper inflation and condition	
Yes	No	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	
Yes	No	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.	
Yes	No	Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.	
Yes	No	Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling.	
Yes	No	Safety devices and operational aids for proper operation	

SIGNATURE OF INSPECTOR _____ DATE _____

Revision History

Rev	Rev Date	Rev By	Approved By	Description
1.0	1.3.2022	Shayne Torrans	Shayne Torrans	Initial Procedure Document
1.1	12.5.2022	Shayne Torrans	Shayne Torrans	Format Revision

Approvals:

Procedure Owner

_____ _____
Print Name Date

_____
Signature

Competency Assessment

No.	Questionnaire	C/NYC
Q1		
A1		
Q2		
A2		
Q3		
A3		
Q4		
A4		
Q5		
A5		

Enclosed Attachments	
Risk Assessment	☑
Environmental Aspect and Impact	☑
Training and Competency	☑
Measure and Evaluation Tools	☑

Competency Checklist

To be filled out by Trainer and signed by Employee, Assessor and Supervisor before being returned to the HSEQT Manager for recording purposes.

Procedure	Competency	Date	Competent YES / NO	Employee Signature

(Please tick appropriate box)

This employee is competent in performing the job. ☐

This employee has not attained the competency level. ☐ *

* *If the employee has not attained all competency levels, the General Manager must assess the action to be taken, provide an extension of training or alternative action as listed below.*

Alternate action to be taken: _____

Signed By

Employee: _____ Date: _____

Trainer: _____ Date: _____

Assessor: _____ Date: _____

Regional Manager: _____ Date: _____

Environmental Aspects and Impacts

Identified Environmental Aspects and Impacts

The following table is a summary of the likely environmental aspects and impacts that may be identified during site inspections. The significance of each impact needs to be assessed using the Risk Assessment Model.

Activity	Aspect	Impact
Purchasing & Administrative Work	Consumption of goods	Conservation of natural resources
	Consumption of energy (eg. Electrical equipment and facilities)	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of waste (eg. Paper)	Consumption of space for waste disposal; Habitat loss
Climate Control	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of noise	Disturbance to community; Habitat loss
Cleaning of – offices / vehicles	Storage, use and release of chemicals	Contamination of air, water or soil; Risk to human health
Transport (Fleet vehicles / staff travel)	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Loss of habitat at all stages of generation; Light pollution
	Consumption of goods (eg. Oil)	Consumption of natural resources; Generation of waste; Habitat loss; Biodiversity impacts
	Generation of waste (eg. Oil)	Consumption of space for waste disposal; Potential contamination of water or soil; Habitat loss
	Exhaust emission	Release of greenhouse gases and atmospheric pollution
	Use of dangerous goods (eg. Batteries)	Potential contamination of air, water or soil; Risk to human health
	Generation of noise	Disturbance to community; Habitat degradation
Operations		

Sample only. To be filled in

Risk Assessment

Risk Assessment // insert name here					
Step No: Logical sequence	**Sequence of Basic Job Steps documented in the Procedure, Work Instruction and project plans. Break down Job into steps.** Each step should be logical and accomplish a major task.	**Potential Safety & Environmental Hazards/Impacts at the site of the Job** Identify the actual and potential health and safety hazards and the environmental impacts associated with each step of the job.	**Risk Rating** Refer to the risk matrix or HSEQT.PRO. Risk Mgt	**Recommended Corrective Action or Procedure** ***Determine the corrective actions necessary to reduce the risk to as low as reasonably practical (ALARP) refer to HSEQ.PRO.Risk Mgt. The risk must be rediced or controlled to ALARP before work commences.*** Document who is responsible for implementing the controls to manage each hazard identified.	**Risk Rating** refer to the risk matrix or HSEQT.PRO.Risk Mgt
1.					
2.					
3.					
4.					
5.					

Audit

Process: insert// **Procedure**: Insert //	Date:	Audited by:
	Location of Audit:	Area Mgr/Supervisor:

Item	Question	Evidence Sited	Comments	Conformance Score 0,3,5
1.				
2.				
3.				
4.				
5.				
6.				
7.				

AUDITOR'S SIGNATURE: SAFETY REP'S SIGNATURE:	CONFORMANCE SCORE: / 25 CONFORMANCE %:	0 – Non-Conformance 3 – Continuous Improvement Opportunity 5 – Total Conformance