

OSHA'S NEW CRANE AND DERRICK STANDARD: SUBPART CC

This summation was prepared by the LHSFNA's Occupational Safety and Health Division Director Scott Schneider. He can be reached at 202-628-5465 or schneider@lhsfna.org. The actual standard includes much more detail and should be consulted and relied on for compliance.

SCOPE 1926.1400

The standard covers all cranes and derricks used in construction with many exceptions. The exceptions include tow trucks used to lift vehicles and clear wrecks, dedicated drilling rigs, tree trimming and removal work, gin poles for erecting communications towers, helicopter cranes, articulating "knuckle-boom" trucks (when used to transfer materials from a crane truck to the ground) and cranes used in railroad operations covered by the Federal Railway Administration.

DEFINITIONS 1926.1401

The standard contains over 100 definitions. Most importantly, it defines a qualified person as one who, by possession of a recognized degree, certificate or professional standing, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work or the project.

GROUND CONDITIONS 1926.1402

The "controlling entity" (or employer in charge) must ensure the ground conditions are safe to support crane use, inform the equipment users and operators of the location of any ground hazards (e.g., voids, tanks, utilities) and talk with the operator or assembly director about what must be done to assure safe ground conditions.

ASSEMBLY/DISASSEMBLY 1926.1403-1406

Manufacturers' procedures for assembly and disassembly must be followed, unless the employer can show that its procedures are as safe as 1926.1406 (with the exception of the use of synthetic slings where the manufacturers' procedures must be used). Assembly/disassembly must be directed by a competent/qualified person also known as the A/D (assembly/disassembly) director. The A/D director must review the procedures before starting work and make sure that the crew members understand the tasks, the hazards and positions/locations to avoid.

Crew members must inform the operator before they go out of his/her view into an area where they could be hurt by movement of the equipment or load, and the operator cannot move the equipment or load until the crew members communicate that it is safe to do so. Employees are not allowed under the boom or jib when pins are being removed unless the employer demonstrates it is necessary and implements special procedures to minimize risk. Hazards that must be addressed include:

- ground conditions
- blocking material and location
- loads on assist cranes
- rigging attachment points
- supports for components when pins are removed
- center of gravity identification
- minimizing snagging of ropes on the boom or pins
- supports for counterweights
- testing of the boom brake
- backward stability of the components
- wind speed/weather

The manufacturer's limitations or those of a registered professional engineer on support of cantilevered booms must be followed. Component weights must be readily available. Components and their configuration must follow the manufacturer's recommendations or those of a registered professional engineer. The crane must be inspected post-assembly. Shipping materials (pins, etc.) must be removed and stored to prevent a falling hazard. Pile driving equipment must not have a jib attached during operation.

Outriggers and stabilizers must be fully extended or deployed as per the load chart. Outriggers must remove the weight from the wheels. Floats, where used, must be attached to the outriggers. Specific requirements exist for blocking outriggers and stabilizers and for locomotive cranes.

Rigging used during assembly/disassembly must be done by a qualified rigger. Synthetic slings must be protected from sharp edges, etc., and according to the manufacturer's recommendations.

During dismantling none of the pins can be removed when parts are in tension or not fully supported.

If an employer does not follow the manufacturer's recommendations, it must use procedures that are developed by a qualified person and are as safe.

POWER LINE SAFETY 1926.1407-1411

Before assembly or disassembly of a crane, the employer must determine if it could come within 20 feet of a power line (up to 350 kV). If so, the employer must (a) confirm with the power

company that the line is deenergized and visibly grounded at the worksite, (b) make sure no part gets within 20 feet of the power line or (c) follow Table A, which has minimum distances based on voltage. If the line is not deenergized, the employer must

- conduct a meeting with the assembly/disassembly crew to review measures to prevent encroachment
- use only nonconductive tag lines
- use a dedicated spotter, a proximity alarm, a range control warning device, an automatic limit device or an elevated warning line/barrier in view of the operator

Cranes cannot be assembled/disassembled below an energized power line or within Table A of a power line. If Table A is used, the owner/utility must provide the voltage to the employer within two days of a request.

Power line must be assumed to be energized until they are confirmed to be deenergized and visibly grounded. Warnings about electrocution hazards must be posted conspicuously in the cab (in view of the operator) and outside the cab (except for overhead gantry and tower cranes).

The work zones around equipment must be demarcated 360 degrees around the equipment to prevent encroachments within 20 feet of a power line. If the line is not deenergized, a meeting must also be held with the crew before operations begin to review the location of the lines and procedures to prevent encroachment. Measures similar to those required during assembly/disassembly must be taken to prevent encroachment, but here an insulating link between the load line and load is also an option.

Operators and crew members must be trained:

- on the procedures to follow in the event of a contact
- that power lines must be presumed to be energized until confirmed and visibly grounded
- that power lines are presumed uninsulated until otherwise confirmed by the owner or a qualified person
- on the limits of insulating links and other devices (e.g. proximity alarms)
- on proper grounding procedures and their limitations.

Spotters must also get applicable training.

The minimum clearance distances are specified in Table A as:

<u>Voltage (kV)</u>	<u>Minimum clearance distance (ft)</u>
Up to 50	10
>50 to 200	15
> 200 to 350	20
>350 to 500	25*
>500 to 750	35*
>750 to 1,000	45*
> 1,000	determined by the utility/owner

* According to 1926.1409, for power lines over 350 to 1,000 kV, the minimum distance is presumed to be 50 feet. Over 1,000 kV, the utility/owner or a registered engineer must establish it.

If work has to operate closer than the Table A values, then the following precautions must be taken at a minimum:

- The employer must show that Table A is infeasible and that it is infeasible to deenergize and ground or relocate the line.
- Safe distances must be determined by the owner/operator of the line or a registered professional engineer who is a qualified person.
- A planning meeting must be held and procedures developed must be implemented (if procedures are inadequate, work must be stopped and new procedures established or the line must be deenergized).
- Automatic reenergizing devices must be inoperative.
- A dedicated spotter must be assigned.
- An elevated warning line/barricade or an insulating link must be installed between the line and the load except for work on electrical transmission/distribution lines covered by Subpart V (additional provisions kick in one to three years after the effective date).
- Non-conductive rigging must be used.
- A range of motion limiting device must be used.
- Non-conductive tag lines must be used.
- Barricades at least 10 feet from the equipment (where feasible) must be established.
- Equipment must be properly grounded.

- Workers must be kept from touching the line above the insulating link.
- Only essential personnel are allowed in the area.
- Insulating line hose or cover up must be installed by the owner/operator unless unavailable.
- The owner and user must meet with the equipment operator and other workers to review procedures.
- One person must be identified who will implement the plan and can stop work if necessary.
- Documentation of these procedures must be immediately available on site.
- Safety devices and aids must comply with manufacturers' specifications.
- All employees must be trained in power line safety per 1926.1408 (g).

Equipment traveling under or near a power line must (a) have a lowered boom/mast and support system, (b) obey minimum clearance distances set in Table T, (c) reduce speeds to minimize breaching, (d) use a dedicated spotter if closer than 20 feet, (e) illuminate or identify the power lines at night and (f) identify and use a safe path of travel.

Table T – Minimum Clearance Distances While Traveling with No Load

Up to 0.75 kV	4 ft
>0.75 to 50 kV	6 ft
>50 to 345 kV	10 ft
>345 to 750 kV	16 ft
>750 to 1,000 kV	20 ft
> 1,000 kV	established by owner or registered professional engineer/qualified person

INSPECTIONS 1926.1412

Inspections by a qualified person are required after modifications, after repairs or adjustments and after assembly. Before each shift, visual inspections by a competent person are required of at a minimum:

- the control mechanisms for maladjustments
- the control and drive mechanisms for excessive wear or contaminants
- pressurized lines for deterioration or leakage

- hydraulic system for proper fluid level
- hooks and latches for damage or wear
- wire rope reeving for compliance with manufacturer's specifications
- wire rope, electrical apparatus, tires for proper inflation and condition
- ground conditions
- equipment level position (before each shift and after each move and setup)
- operator cab windows for defects
- rails systems for equipment running on rails
- safety devices and operational aids for proper installation

If any deficiencies are found, the competent person must determine if they present a safety hazards. If so, equipment must be taken out of service until corrected. Another monthly inspection must be made and documented with results, name and signature of the inspector. Documentation must be kept for at least three months. More in depth annual inspections by a qualified person are also required. Some disassembly may be required for this inspection. Annual inspections must also be documented with records kept for at least 12 months and made available to inspectors. Severe conditions also trigger inspections by a qualified person. A qualified person must also inspect any equipment that has been idle for three months or more. Any manufacturer's recommendations for more frequent inspections must be followed.

WIRE ROPE 1926.1413-1414

Wire rope must be visually inspected by a competent person each shift. Apparent deficiencies are categorized in three categories: I – significant distortions or corrosion, electrical arc damage and improper or damaged end connections; II – visible broken wires or with five percent reduced diameter; and III – core failures broken strands or prior electrical contact. Special attention must be paid to terminal ends, reverse bends, pick up points, etc. Deficiencies found must be corrected or localized or the wire rope replaced before use. The wire rope must be tagged out until it is replaced.

Monthly and more in-depth annual inspections of wire rope by a qualified person are also required.

Design criteria are specified for original and replacement wire rope (citing ASME B30.5 – 2005 Section 5- 1.7.1 as one reference) and rotation resistant rope. Special requirements exist for rope used in boom hoist reeving.

Inspections must be documented. Records must be retained and made available to inspectors.

SAFETY DEVICES 1926.1415

All cranes (except for floating ones) must have:

- an operational crane level indicator
- boom stops
- jib stops (except for derricks)
- locking foot pedal brakes
- integral holding device/check valve on hydraulic outrigger/stabilizer jacks
- rail clamps and stops (if equipment is on rails)
- a functional horn

Equipment must be stopped and work must not begin unless all safety devices are in working order.

OPERATIONAL AIDS 1926.1416

The following operational aids in working order are required on all equipment (with some exceptions based on age and type of crane):

- Category I (must be repaired within seven days after deficiency occurs) – boom hoist limiting device, luffing jib limiting device, anti two-blocking device
- Category II (must be repaired within 30 days after deficiency occurs) – boom angle or radius indicator, jib angle indicator, boom length indicator, load weighing device, outrigger/stabilizer position sensor/monitor, hoist drum rotation indicator

OPERATION 1926.1417

Employers must comply with all manufacturer procedures. If they are unavailable, they must develop and comply with their own procedures, developed by a qualified person and registered professional engineer. These procedures must be readily available to the operator in the cab. If not (e.g., electric failure), operations must cease. Operators are not allowed to be distracted by other activities, such as use of cell phones. They cannot leave the controls with a suspended load (with some exceptions, such as for “working gear”). Out of service equipment must be tagged-out and not operated until tags are removed by an authorized person.

The operator must verify that the controls are working and that all personnel are in the clear before starting the engine. A competent person must determine if equipment must be secured when a local storm warning is issued. If any repairs or adjustments are made, notifications must be made in writing. Safety devices and operational aids are not a substitute for professional judgment by the operator.

A competent person must verify that rope is being reseeded properly on the drum, if slack rope requires it. A competent person must also adjust the equipment or operations for wind, ice and snow conditions.

Equipment must not be operated in excess of its rated capacity, and operators cannot be made to do so. Operators have to verify that the load is within the equipment's capacity by calculation, use of a load weighing device or other means. The boom and equipment must not contact any obstructions. Loads cannot be pulled or dragged sideways. For wheel-mounted equipment, loads cannot be lifted over the front area (unless permitted by the manufacturer). Brakes must be tested each time a load that is 90 percent or more of the maximum line pull is lifted.

Operators cannot travel with a load if prohibited by the manufacturer. Traveling with a load must be supervised by a competent person who first determines if it is necessary. Rotation of the load during travel must be controlled. Operators must obey stop signals, no matter who gives them. Locomotive cranes must not swing such that they could hit adjacent cars. Cranes (except tower cranes) must not be operated without the counterweights recommended by the manufacturer in place.

STOP WORK 1926.1418

Operators have the authority to stop work or refuse to handle loads until a qualified person has determined if it is safe.

SIGNALS 1926.1419-1422

A signal person is required when the operator is not in full view of the load area or load travel, when the travel view is obstructed or whenever the operator or load handler determines one is needed. Signal persons can use hand signals (see Appendix A), voice, audible signals or "new signals." Non-standard hand signals must be agreed upon ahead of time. New signals must be equally effective and comply with a national consensus standard. Signals must be appropriate to the conditions, and the ability to transmit them must be maintained at all times. Operations must stop if interference interrupts transmission. Only one person can give signals at a time, except when a safety problem requires an emergency stop. All signal directions must be given from the operator's perspective. If one signal person is signaling for more than one crane/derrick, they must be able to identify the one to which they are signaling. Signaling devices must be tested before operations and generally use dedicated channels. Operators must be able to receive signals hands-free. Voice signals must be coordinated and include three elements: function,

direction; distance and/or speed; and function, stop command. Communication must be in a common language. Hand signal charts must be posted near the operation or on the vehicle.

FALL PROTECTION 1926.1423

New equipment (manufactured one year after the effective date) with lattice booms must have walkways at least 12 inches wide, if the boom is six feet or higher. Walkways on booms are not permitted to have guardrails or handrails if they could be snagged by the ropes or bars or if they are removable. New equipment must also provide for safe access and egress from the ground and have slip-resistant walking/stepping surfaces. SAE standards are referenced. Personal fall arrest systems (PFAS) must meet the fall prevention standard (1926.502 (d)) except that body belts are allowed for positioning as in 1926.502 (d). PFAS must be used when moving around on non-lattice booms, on non-horizontal lattice booms and on horizontal lattice booms 15 or more feet high and on assembly/disassembly work at that height except in the cab, on the deck or at or near draw-works (when running). Anchorage requirements follow 1926.502 (d) (15) and (e) (2) unless a competent person determines otherwise. Fall restraint systems must withstand twice the maximum load under reasonably anticipated conditions. PFAS can be anchored to the hook or load line after review by a qualified person if the operator has knowledge and no load is being suspended. Training is required.

WORK AREA CONTROL 1926.1424

Employees must be trained and protected from entering the swing radius zone of the equipment. Control lines must be erected where feasible, or, if infeasible, warning signs and training are required. They must inform the operator if they are moving out of his/her view, and the operator must not rotate the equipment until communication establishes that it is clear. When on a site with multiple cranes, a system to prevent cranes from colliding with each other must be established.

KEEPING CLEAR OF THE LOAD 1926.1425

Operators must use routes that minimize exposure to hoisted loads (consistent with public safety). No employees are allowed in the fall zone under a non-moving suspended load unless they are hooking, unhooking or guiding the load; initially attaching the load to a structure or component; or operating a concrete hopper or bucket. When hooking, unhooking or guiding a load, a qualified rigger must prevent unintentional displacement and use self-closing latches (except J hooks are allowed for wood trusses). When landing a load, only essential personnel are allowed in the fall zone and only when necessary to guide, monitor and detach/ attach a load. Rigging requires a qualified rigger.

FREE FALL AND CONTROLLED LOAD LOWERING 1926.1426

Boom free fall and free fall of loads is prohibited if employees are in the fall zone or are being hoisted or if the load/boom is over a power line, a shaft (unless no one is in it) or a cofferdam or is in a refinery or tank farm. Boom free fall in other cases requires equipment older than November 1984 or floating equipment. Equipment to prevent boom free fall requires a secondary mechanism such as friction drums with a friction clutch or hydraulic drums with an integral brake. Hydraulic telescoping booms must prevent retraction if there is hydraulic failure.

OPERATOR QUALIFICATIONS 1926.1427

Employers must make sure that equipment operators are qualified or certified to operate the equipment. Operators can become certified through testing by a nationally recognized accrediting agency or through an audit by their employer. Employer programs require verification by a third-party auditor. They may be qualified by the U.S. military but only if they are military employees and not private contractors. They can also be licensed by a government entity. Certification/licensing is through a written and practical test. Certification through a nationally accredited testing agency is portable and good for five years. Certifications by the employer or the military are not portable and also valid for up to five years. Operators-in-training, who are not yet certified, must be continuously monitored, except for short breaks, by a certified operator (who has passed at least the written test). Several other restrictions apply. As necessary, tests may be administered verbally or in other languages. Certification is only good for a specific piece of equipment and a certain maximum capacity. This requirement has a four-year phase-in period.

SIGNAL PERSON QUALIFICATIONS 1926.1428

A signal person's qualifications must be evaluated by either a third party qualified evaluator or by the employer's qualified evaluator. Evaluations by an employer's evaluator are not portable, while third party evaluations are. Documentation must be available on site and specify the type of signaling for which signal persons are qualified (e.g. hand signals, etc.). Evaluations must include both a written/oral test and a practical test.

QUALIFICATIONS OF MAINTENANCE & REPAIR PERSONNEL 1926.1429

Maintenance, inspection and repair personnel must be "qualified persons" and can only operate equipment as needed to do their work or under the direct supervision of an operator.

TRAINING 1926.1430

The employer must provide the following training:

- Training on overhead power lines

- Training for signal persons
- Training for operators
- Training for Competent and Qualified Persons
- Training on avoidance of crush/pinch points
- Training on tag-out and start-up procedures

Training must be provided at no cost to employees and must include an evaluation. Refresher training is also required.

HOISTING PERSONNEL 1926.1431

Except for steel erection, use of a crane to hoist personnel is only allowed when other means are more hazardous or not possible (due to structural design or worksite conditions). The equipment must be set up properly (e.g., level). The total load must not exceed 50 percent of capacity. When stationary, all brakes must be engaged. Equipment must have properly functioning devices, that is, boom angle indicators, hoist limiting devices, anti two-block devices and controlled load lowering devices. Equipment must not be operated if these devices are not working. A personnel platform cannot be directly attached to a luffing jib.

The personnel platform system must be designed by a qualified person. The personnel platform must be kept within ten degrees of level and designed to minimize tipping. The platform must support its own weight and five times the maximum load and meet other structural requirements (e.g., guardrails, welds, grab rails, access gates/doors, headroom, and overhead protection). Its rated capacity must be conspicuously posted. Trial lifts must be made to each planned location before each shift, after equipment is moved and if the lift route is changed. A competent person must determine if the trial lift is done safely and conduct an inspection before and after the trial and proof lifts. Any deficiencies found during the trial must be corrected before personnel are hoisted. A proof test must be done prior to any hoisting (but can be the same as the trial lift).

Hoisting must be in a slow, controlled, cautious manner with no sudden movements. All body parts must be kept inside. Employees cannot stand on the guardrails or toe board or pull the platform out of plumb. The platform must be secured to the structure before it is exited or entered. Controls on the platform must be operated by a qualified person. The operator must remain at the controls while the platform is occupied (if controls are not in the platform) or must be on site and in view of the equipment. If wind speeds exceed 20 mph or other dangerous weather conditions are present, a qualified person must determine if it is safe to lift or stop a lift in progress. Employees being hoisted must be in direct communication with the operator or signal person.

The hoist must have a personal fall arrest system. No lifts can be made on other load lines while hoisting personnel, except factory-produced, boom-mounted personnel platforms with a winch. Hoisting cannot normally occur while equipment is traveling, except under specific conditions and never for derricks.

A pre-lift meeting of the operator, signal person employees to be hoisted and the person responsible must be held.

Hoisting personnel is generally prohibited near power lines. Special requirements exist for hoisting personnel in drill shafts, in pile driving operations, to and from a marine worksite and for storage-tank, shaft and chimney operations. For some of these operations, boatswain's chairs are allowed.

All other requirements of Subpart CC also apply to hoisting personnel.

MULTIPLE-CRANE/DERRICK LIFTS 1926.1432

Multiple crane lifts must be planned by a qualified person and directed by a person who is both qualified and competent or a competent person assisted by a qualified person. The lift director must meet and review the plan with those involved with the lift.

DESIGN, CONSTRUCTION AND TESTING 1926.1433

Equipment rated to lift more than 2,000 pounds must meet ASME B30.5 - 1968 or 2004 or meet prototype testing in BS EN 14439:2006 or BS EN 13000:2004. All equipment must have information in the cab on rated capacity, load capacities, a work area chart indicating the areas where no load is to be handled, etc. Load hooks and related equipment must be of sufficient weight. Hooks and balls must be marked with rated capacity and weight. Hooks generally cannot be used without latches which close at the throat and keep slings in while the rigging is slack. Posted warnings must be kept legible. A fire extinguisher must be accessible on the equipment. Cabs must have proper ventilation to maintain visibility and have doors that will not open inadvertently while operating or traveling, safety glass windows in front and both sides, guarded belts and gears, insulated/guarded exhaust pipes, protected hydraulic/pneumatic lines and exhaust directed away from the cab. Friction mechanisms must be sufficient for the loads.

If they have not modified the equipment, employers can rely on documentation that the manufacturer designed and built the equipment to meet this standard.

EQUIPMENT MODIFICATIONS 1926.1434

Equipment modifications are prohibited unless the manufacturer approves them or, if they refuse or are unavailable or unresponsive, a registered professional engineer who is a qualified person approves them.

SPECIFIC CRANE TYPES

Specific supplemental requirements are included for:

Tower Cranes	1926.1435
Derricks	1926.1436
Floating Cranes/Derricks and land cranes/derricks on barges	1926.1437
Overhead and Gantry Cranes	1926.1438
Dedicated Pile Drivers	1926.1439
Sideboom Cranes	1926.1440
Equipment with a rated capacity of 2,000 pounds or less	1926.1441

NOTE:

OSHA HAS DETERMINED THAT THE NEW CRANE STANDARD WILL NOT PREEMPT LOCAL ORDINANCES AS LONG AS THEY MEET OR EXCEED THE NEW STANDARD.