**Cranes/Derricks—Multiple Crane/Derrick Operation Plan and Procedures**

**29 CFR PART** [**1926.1432**](https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1432)**—Multiple Crane/Derrick Lifts-Supplemental Requirement**

***Scope/Application:*** *This standard applies when more than one crane/derrick will be supporting the load.*

***Standard Requirements for 29 CFR 1926, Subpart CC—Cranes & Derricks in Construction:***

* ***Programs/Plans:*** *Multiple Crane/Derrick Operation Plan; Mobile Auxiliary Crane Plan*
* ***Procedures/Practices:*** *Work procedures (Include in your Plan)*
* ***Training:*** *Initially*
* ***Inspections:*** *Initially, each shift, monthly, annually*
* ***Recordkeeping:*** *Plan, inspections, certifications*

***Example Program:*** *The following example plan may be modified to be site-specific to the organization. Please reference 29 CFR 1926.1432—Multiple Crane/Derrick Lifts-Supplemental Requirement and Subpart CC—Cranes & Derricks in Construction to ensure that all requirements are being met.*

**Multiple Crane/Derrick Operation Plan and Procedures**

**Plan Development Procedures**

Before beginning a crane/derrick operation in which more than one crane/derrick will be supporting the load, the operation will be planned.

* Each plan will be developed by a qualified person.
* The plan will be designed to ensure that the requirements of Subpart CC—Cranes & Derricks in Construction are met.
* Whenever the qualified person determines that engineering expertise is needed for the planning, it will be provided.

**Plan Implementation Procedures**

The multiple-crane/derrick lift will be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons (lift director).

The lift director will review the plan in a meeting with all workers who will be involved with the operation.

**Inspection Procedures**

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

The inspection will meet all of the following requirements:

* Inspection will assure that the modifications or additions have been done with the approval of the manufacturer or registered professional engineer (RPE).
* Inspection will include functional testing of the equipment.
* Equipment will not be used until an inspection has been approved by the manufacturer or an RPE.

*Repaired/adjusted equipment—*Equipment that has had a repair or adjustment that relates to safe operation (such as: A repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism), will be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use.

The inspection will meet all of the following requirements:

* The qualified person will determine if the repair/adjustment meets manufacturer equipment criteria (where applicable and available).
* Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person will:
  + Determine if an RPE is needed to develop criteria for the repair/adjustment. If an RPE is not needed, we will ensure that the criteria are developed by the qualified person. If an RPE is needed, we will ensure that they are developed by an RPE.
  + Determine if the repair/adjustment can be developed by a qualified person or an RPE is required.
* Inspection will include functional testing of the repaired/adjusted parts and other components that may be affected by the repair/adjustment.
* Equipment will not be used until an inspection demonstrates that the repair/adjustment meets manufacturer requirements and approval.

*Post-assembly**—*Upon completion of assembly, the equipment will be inspected by a qualified person to assure that it is configured in accordance with manufacturer equipment criteria.

Where manufacturer equipment criteria are unavailable, a qualified person will:

* Determine if an familiar with the type of equipment involved is needed to develop criteria for the equipment configuration. If an RPE is not needed, we will ensure that the criteria are developed by the qualified person. If an RPE is needed, we will ensure that they are developed by an RPE.
* Determine if the equipment meets the criteria of needing an RPE.
* Equipment will not be used until an inspection demonstrates that the equipment is configured in accordance with the applicable criteria.

*Each shift—*A competent person will begin a visual inspection prior to each shift the equipment will be used, which must be completed before or during that shift.

* The inspection will consist of observation for apparent deficiencies.
* Taking apart equipment components and booming down is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart equipment components or booming down is needed.
* Determinations made in conducting the inspection will be reassessed in light of observations made during operation.

At a minimum, the inspection will include all of the following:

* Control mechanisms for maladjustments interfering with proper operation.
* Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.
* Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.
* Hydraulic system for proper fluid level.
* Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.
* Wire rope reeving for compliance with the manufacturer's specifications.
* Wire rope.
* Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.
* Tires (when in use) for proper inflation and condition.
* 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. 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.
* Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.
* Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling.
* Safety devices and operational aids for proper operation.

*Deficiencies—*If any deficiency or any additional inspection items required to be checked for specific types of equipment is identified, an immediate determination will be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, the equipment will be taken out of service until it has been corrected.

If any deficiency is identified for safety devices/operational aids, operations will not begin until they are in working order.

*Monthly—*Each month the equipment is in service, it will be inspected each shift. Equipment will not be used until an inspection demonstrates that no corrective action is required.

*Documentation of shift and monthly inspections—*The following information for the inspections conducted each shift and monthly will be documented and maintained for 3 months:

* The items checked and the results of the inspection.
* The name and signature of the person who conducted the inspection and the date.

*Annual/comprehensive—*At least every 12 months, the equipment will be inspected by a qualified person. If needed, disassembly may be required to complete the inspection.

The equipment will be inspected for all of the following:

* Equipment structure (including the boom and, if equipped, the jib)
* Structural members: Deformed, cracked, or significantly corroded
* Bolts, rivets and other fasteners: loose, failed or significantly corroded
* Welds for cracks
* Sheaves and drums for cracks or significant wear
* Parts such as pins, bearings, shafts, gears, rollers and locking devices for distortion, cracks or significant wear
* Brake and clutch system parts, linings, pawls and ratchets for excessive wear
* Safety devices and operational aids for proper operation (including significant inaccuracies)
* Gasoline, diesel, electric, or other power plants for safety-related problems (such as leaking exhaust and emergency shut-down feature) and conditions, and proper operation
* Chains and chain drive sprockets for excessive wear of sprockets and excessive chain stretch
* Travel steering, brakes, and locking devices, for proper operation
* Tires for damage or excessive wear

Hydraulic, pneumatic and other pressurized hoses, fittings and tubing, will be inspected as follows:

* Flexible hose or its junction with the fittings for indications of leaks
* Threaded or clamped joints for leaks
* Outer covering of the hose for blistering, abnormal deformation or other signs of failure/impending failure
* Outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing
* Hydraulic and pneumatic pumps and motors, as follows:
  + Performance indicators: Unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure
  + Loose bolts or fasteners
  + Shaft seals and joints between pump sections for leaks

Hydraulic and pneumatic valves, will be inspected as follows:

* Spools: Sticking, improper return to neutral, and leaks
* Leaks
* Valve housing cracks
* Relief valves: Failure to reach correct pressure (if there is a manufacturer procedure for checking pressure, it must be followed)

Hydraulic and pneumatic cylinders, will be inspected as follows:

* Drifting caused by fluid leaking across the piston
* Rod seals and welded joints for leaks
* Cylinder rods for scores, nicks, or dents
* Case (barrel) for significant dents
* Rod eyes and connecting joints: Loose or deformed
* Outrigger or stabilizer pads/floats for excessive wear or cracks
* Slider pads for excessive wear or cracks
* Electrical components and wiring for cracked or split insulation and loose or corroded terminations
* Warning labels and decals originally supplied with the equipment by the manufacturer or otherwise required: Missing or unreadable
* Originally equipped operator seat (or equivalent): Missing
* Operator seat: Unserviceable
* Originally equipped steps, ladders, handrails, guards: Missing
* Steps, ladders, handrails, guards: In unusable/unsafe condition

This inspection will include functional testing to determine that the equipment as configured in the inspection is functioning properly.

* If any deficiency is identified, an immediate determination will be made by the qualified person as to whether the deficiency constitutes a safety hazard or, though not yet a safety hazard, needs to be monitored in the monthly inspections.
* If the qualified person determines that a deficiency is a safety hazard, the equipment will be taken out of service until it has been corrected, except when temporary alternative measures are implemented.
* If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, we will ensure that the deficiency is checked in the monthly inspections.

*Documentation of annual/comprehensive inspection—*The following information will be documented, maintained, and retained for a minimum of 12 months:

* The items checked and the results of the inspection.
* The name and signature of the person who conducted the inspection and the date.

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

* Inspect the equipment for structural damage to determine if the equipment can continue to be used safely.
* In light of the use/conditions determine whether any items/conditions need to be inspected; if so, the qualified person will inspect those items/conditions.
* If a deficiency is found, the qualified person will determine if it constitutes a safety hazard and take appropriate corrective action.

*Equipment not in regular use—*Equipment that has been idle for 3 months or more will be inspected by a qualified person before initial use.

*Manufacturer procedures—*Any part of a manufacturer's procedures regarding inspections that relate to safe operation (such as to a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) that is more comprehensive or has a more frequent schedule of inspection than the above requirements will be followed.

**Hazard Assessments**

Before beginning equipment operations, we will follow these procedures:

* Identify the work zone by either demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the equipment past those boundaries, or defining the work zone as the area 360 degrees around the equipment, up to the equipment's maximum working radius.
* Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line.
* Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line. If so, we will do one of the following options:

* 1. *Deenergize and ground*. Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.
  2. *20 foot clearance*. Ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line.
  3. *Table A clearance*. Determine the line's voltage and the minimum approach distance permitted by Table A below:

TABLE A—MINIMUM CLEARANCE DISTANCES

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

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

* Determine if any part of the equipment, load line or load (including rigging and lifting accessories), while operating up to the equipment's maximum working radius in the work zone, could get closer than the minimum approach distance of the power line permitted under Table A. If so, then we will ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum approach distance.

*Preventing encroachment/electrocution*. Where encroachment precautions are required, we will do the following:

* Conduct a planning meeting with the operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.
* If tag lines are used, they will be non-conductive.
* Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at 20 feet from the power line or at the minimum approach distance under Table A. If the operator is unable to see the elevated warning line, a dedicated spotter will be used in addition to implementing one of the following measures:
  + A proximity alarm set to give the operator sufficient warning to prevent encroachment.
  + A dedicated spotter who is in continuous contact with the operator. Where this measure is selected, the dedicated spotter will:
    - Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: A clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).
    - Be positioned to effectively gauge the clearance distance.
    - Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.
    - Give timely information to the operator so that the required clearance distance can be maintained.
    - A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device will be set to give the operator sufficient warning to prevent encroachment.
    - A device that automatically limits range of movement, set to prevent encroachment.
    - An insulating link/device, will be installed at a point between the end of the load line (or below) and the load.

*Voltage information*. When Table A is used, the utility owner/operator of the power lines will be asked to provide the requested voltage information within two working days of the employer's request.

*Operations below power lines*.

* No part of the equipment, load line, or load (including rigging and lifting accessories) is allowed below a power line unless we have confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line
  + *Exceptions*. Not applicable when we can demonstrates that one of the following applies:
    - The work is covered by Subpart V*—Electric Power Transmission and Distribution*.
    - For equipment with non-extensible booms: The uppermost part of the equipment, with the boom at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A of this section minimum clearance distance below the plane of the power line.
    - For equipment with articulating or extensible booms: The uppermost part of the equipment, with the boom in the fully extended position, at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A of this section minimum clearance distance below the plane of the power line.
    - Demonstrates that compliance is infeasible and meets the following: The power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution determines the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions. The factors that must be considered in making this determination include, but are not limited to: Conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line, and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.

*Power lines presumed energized*. We will assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.

When working near transmitter/communication towers where the equipment is close enough for an electrical charge to be induced in the equipment or materials being handled, the transmitter will be deenergized or the following precautions taken:

* The equipment will be provided with an electrical ground.
* If tag lines are used, they will be non-conductive.

**Training**

*Overhead powerlines*. Training will include:

* The procedures to be followed in the event of electrical contact with a power line.
* 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 will also be trained to enable them to effectively perform their task.

*Signal persons*. Each employee who will be assigned to work as a signal persons will receive training and meet qualification requirements:

* 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 relevant requirements of the work to which they are assigned.
* Demonstrate knowledge through an oral or written test, and through a practical test.

*Operators-in-Training for equipment where certification or qualification is required.* Each employee who will be assigned to operate a piece of equipment will be trained on:

* The controls and operational/performance characteristics.
* Use of, and the ability to calculate (manually or with a calculator), load/capacity information on a variety of configurations of the equipment.
* Procedures for preventing and responding to power line contact.
* Tagout procedures.
* Crush/pinch points and other related hazards.
* Technical knowledge applicable to the specific type of equipment the individual will operate including:
  + The suitability of the supporting ground and surface to handle expected loads.
  + Site hazards.
  + Site access.
  + Cranes and derricks standard.
* Be able to read and locate relevant information in the equipment manual and other materials containing information necessary for the safe operation of the equipment.
* Demonstrate knowledge through a practical test that the individual has the skills necessary for safe operation of the equipment, including the following:
  + Ability to recognize, from visual and auditory observation, and conducting shift inspections.
  + Operational and maneuvering skills.
  + Application of load chart information.
  + Application of safe shut-down and securing procedures.

*Competent persons and qualified persons*. Each competent person and qualified person will be trained on the requirements of Cranes and Derricks Standard applicable to their respective roles.

*Refresher training.* We will evaluate each employee’s training to confirm that the employee understands the information provided in the training.

Refresher training will be provided in relevant topics for each employee when, based on the conduct of the employee or an evaluation of the employee's knowledge, there is an indication that retraining is necessary.

**Free Outreach Resources:**

[*Safety and Health Programs and Plans*](https://www.labor.nc.gov/safety-and-health/publications/example-programs) *(i.e., Example Programs to be Made Site-Specific)*

[*A - Z Safety and Health Topics*](https://www.labor.nc.gov/safety-and-health/occupational-safety-and-health/occupational-safety-and-health-topic-pages) *(i.e., Learn More About Safety and Health Topics)*

[*Which Standards Apply?*](https://www.labor.nc.gov/which-osha-standards-apply) *(Identify the Standards Applicable to Your Worksite)*

[*Safety and Health Presentations*](https://www.labor.nc.gov/document-collection/osh-presentations) *(Downloadable Presentations to be Made Site-Specific)*

[*OSH Training Calendar*](https://www.labor.communications.its.state.nc.us/OSHPublic/ETTA/class_regist/calendar.cfm) *(i.e., Register for Webinars, In-Person Classroom Training, Virtual Events)*

[*Streaming Video Services*](https://www.labor.nc.gov/safety-and-health/library/how-borrow-dvds-and-videos#are-your-videos-online) *(On-Demand Training)*

[*Request Outreach Services*](https://www.labor.communications.its.state.nc.us/OSHPublic/ETTA/Outreach/Outreach_Request_Form.html) *(i.e., Request Training, Booths, Guest Speaker)*

[*AskOSH*](https://www.labor.nc.gov/safety-and-health/occupational-safety-and-health/ask-osh) *(Interpretations)*