

Clearheart Construction Co., Inc.

Mobile Crane / Overhead & Gantry Crane / Rigging

CRANES & RIGGING

Overhead and gantry cranes - 1910.179

Crawler locomotive and truck cranes – 1910.180

Cranes and derricks. - 1926.550

Cranes, like all pieces of heavy equipment, if not properly operated, inspected and maintained have a potential for causing major bodily injury or property damage. Care must be taken in all facets of crane operation.

Not only do cranes require a thorough annual inspection (a record of the dates and results of these inspections will be maintained by our safety program administrator), they require inspection prior to each use and even during use by a competent person. Any deficiencies will be repaired or replaced before continued use. All inspections will be made by qualified, competent person(s). An inspection form for daily and monthly inspections is found in our project manual. Monthly inspections must be certified by the safety program administrator.

As with all items of machinery, only those trained in safe work practices and deemed qualified will be designated as authorized persons to operate cranes.

Overhead and Gantry Cranes:

An overhead crane is a machine for lifting and lowering a load as well as moving it horizontally on a fixed runway structure. The hoisting mechanism is an integral part of the crane.

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

A minimum of 3 inches overhead and 2 inches laterally must be provided and maintained between the crane and obstructions. Where passageways or walkways are provided, obstructions must not be placed so that safety or personnel will be jeopardized by movements of the crane.

Only designated employees, who have received training in crane operations, will be permitted to operate a crane.

The operator must always have a clear view of the load.

The operator must have training in the use of fire extinguishers.

Note: under no circumstances will a carbon tetrachloride extinguisher be used.

All exposed moving parts which might constitute a hazard during normal operating conditions must be guarded.

Specific requirements for crane installation, set-up, and testing are found in 29 CFR 1910.179.

Frequent [daily to monthly intervals] and periodic [1 to 12 month intervals] must be accomplished.

A preventive maintenance program base upon the crane manufacturer's recommendations will be established.

Inspections:

Frequent inspection - Daily to monthly intervals.

1. All functional operating mechanisms for maladjustment interfering with proper operation. Daily.
2. Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems. Daily.
3. Hooks with deformation or cracks. Visual inspection daily; monthly inspection with a certification record which includes the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, of the hook inspected. For hooks with cracks or having more than 15 percent in excess of normal throat opening or more than 10 percent twist from the plane of the unbent hook refer to paragraph (l)(3)(iii)(a) of 29 CFR 1910.179.
4. Hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations. Visual inspection daily; monthly inspection with a certification record which includes the date of inspection, the signature of the person who performed the inspection and an identifier of the chain which was inspected.
5. All functional operating mechanisms for excessive wear of components.
6. Rope reeving for noncompliance with manufacturer's recommendations.

Periodic inspection - 1 to 12-month intervals.

1. Deformed, cracked, or corroded members.
2. Loose bolts or rivets.
3. Cracked or worn sheaves and drums.
4. Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices.
5. Excessive wear on brake system parts, linings, pawls, and ratchets.
6. Load, wind, and other indicators over their full range, for any significant inaccuracies.

7. Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with applicable safety requirements.
8. Excessive wear of chain drive sprockets and excessive chain stretch.
9. Electrical apparatus, for signs of pitting or any deterioration of controller contactors, limit switches and pushbutton stations.
10. All ropes must be inspected at least once a month and a certified record of these inspections will be maintained recording the dates of the inspections and the signature of the person who performed the inspection.

Before any repairs are started, a warning or “Out of Order” sign will be placed on the crane.

Crawler Locomotive and Truck Cranes:

A mobile crane is an indispensable piece of equipment on certain job sites. Its ability to lift massive weight to extreme heights allows work to be done that would be impossible without it. If you are not directly involved in crane or hoisting operations, stay clear! Crane safety involves the integrity of the crane itself, the knowledge and skill of the operator, and the actual hoisting procedures including setup, inspection, and operations.

Only designated employees, who have received training in crane operations, will be permitted to operate a crane.

The operator must always have a clear view of the load.

The operator must have training in the use of fire extinguishers and a CO₂ or dry chemical fire extinguisher must be in the cab or readily accessible.

Written reports on rated load tests and the test procedures and confirming the adequacy of any repairs or alterations will be maintained.

All running ropes will be inspected at least once a month and a certified record of these inspections will be maintained recording the dates of the inspections and the signature of the person who performed the inspection. All ropes in storage for a month or more will be thoroughly inspected before use and the above inspection records will be maintained.

A rating chart, with clearly legible letters & figures will be affixed securely in each crane cab and be readily visible to the crane operator.

It should be noted that most common crane accident involves crane or boom contact with energized power lines. However, all the below safety items are important and should be included in any safety audit. A review or inspection of:

- a. the entire construction area to determine how the crane operation affects other operations and crafts working with or around the crane.

- b. operator training and qualification.
- c. all crane records including frequent (performed by the operator at the start of each shift) and periodic (at 1 to 12 month intervals) inspections used to determine the need for repair or replacement of components to keep the machine in proper operating condition. Inspection and maintenance records, the operator's manual, and load charts must be readily available.
- d. the actual crane set-up to include proximity of electrical power lines; leveling; clearance for rotation; outriggers, if applicable; and stability (the relationship of the load weight, angle of the boom, and its radius to the center of gravity of the load).
- e. the structural integrity of the crane's main frame, crawler, track and outrigger supports, boom sections, and attachments.
- f. all wire ropes, cables, hydraulic lines, chains, hooks, etc..
 - 1. All ropes will be thoroughly inspected before crane is used certified by record of inspection, ID of the rope inspected and signature of the person performing the inspection.

Because working around or near electrical power lines is identified as the leading cause of crane accidents, there must be a minimum clearance of 10' from lines and:

- a. cranes should not handle materials or loads stored under electric power lines.
- b. operation of mobile cranes near de-energized electric power lines is not recommended until the following steps have been taken:
 - 1. the power company or owner of the power line has deenergized the lines.
 - 2. the lines are visibly grounded and appropriately marked.
 - 3. durable warning signs are installed at the operator's station and on the outside of the crane identifying the clearance requirements between the crane/load and electric power lines.
 - 4. a qualified representative of the power company or owner of the electric power line is on the job site to verify that the power lines have been de-energized or properly grounded.

Prior to authorization to operate a crane, operators of cranes with a **boom length of 25 feet or more and a maximum rated load capacity of 15,000 pounds or more** must:

- a. have a valid certificate of competency issued by an Accredited Certifying Entity for the type or crane being used.

- b. pass a physical examination that meets the requirements of either ASME B30.5-2000 or US DOT standard 49 CFR 392.41 through 391.49.
- c. pass a written examination that covers, at least:
 1. operational characterizes and controls for the crane type for which qualification is being sought.
 2. emergency control skills such as a response to fire, power line contact, loss of stability, and control malfunction.
 3. demonstration of basic arithmetic skills necessary for crane operation and the ability to read and comprehend the crane manufacturer's operation and maintenance instruction manuals, including load capacity information **(load charts)** for the crane for which certification is sought.
 4. pass a hands-on examination to demonstrate proficiency in operating the specific crane including pre-start and post-start inspection, maneuvering skills, shutdown, and securing procedures.

Operator certificates are valid for five (5) after which recertification is required.

All crawler, truck, or locomotive cranes will meet the applicable requirements for design, inspection, construction, testing, maintenance and operations as prescribed in ANSI B30.5-1968. A crane inspection certification record will be maintained which shows the date, the items inspected, the serial number of the crane and the signature of the inspector.

The operator will ensure that a 5BC (or greater) fire extinguisher is readily accessible during operation.

All rated load capacities, recommended operating speeds, special hazard warnings or instructions must be readily visible to the operator while operating the crane. At all times, the manufacturer's specifications and limitations will be adhered to. Attachments will not exceed the capacity, rating, or scope recommended by the manufacturer.

Any modifications to crane equipment which might affect safety may only be done with written approval from the manufacturer.

While cranes easily have the lifting ability to hoist employees on a personnel platform, this is absolutely prohibited except in cases when the erection, use, and dismantling of conventional means of reaching the worksite would be more hazardous or is not possible because of structural design or worksite

conditions. A conventional means would include: a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold.

It is absolutely imperative that the possibility of electrocution be totally eliminated. This can be accomplished by adhering to the safe distances from various currents noted in Heavy Equipment and Electrical Power Lines, below.

Except where electrical distribution and transmissions lines have been deenergized and visibly grounded at point of work or where insulating barriers (not attached to the vehicle) have been erected to prevent physical contact with the lines, the following clearance -- between any part of the vehicle and the line -- will be observed:

<u>Line Rating</u>	<u>Minimum Clearance</u>
50 kV. or below	10 feet
Over 50 kV.	10 feet plus .04 inch for each 1 kV. over 50 kV, or twice the length of the line insulator, but never less than 10 feet.

In transit, equipment clearance must be a minimum of:

<u>Line Rating</u>	<u>Minimum Clearance</u>
50 kV. or below	4 feet
Over 50 kV. to 345 kV.	10 feet
Over 345 kV. to 750 kV.	16 feet

A ground guide will be designated to observe clearance of the equipment and give warning to the equipment operator in situations where it is difficult for the equipment operator to maintain the desired clearances by visual means.

An overhead wire will be considered energized unless the owner of the line or the electrical utility authorities indicate that it is not energized and it has been visibly grounded.

Dangers associated with cranes include numerous moving parts. These dangers can be minimized or eliminated by ensuring that all guards are in place and not tampered with.

Care must be taken to ensure that areas within the swing radius of the rear of the rotating superstructure of the crane are barricaded to prevent a person from being struck or crushed.

All employees must keep clear of loads that are about to be lifted as well as suspended loads.

When using slings made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and

synthetic web (nylon, polyester, and polypropylene), the following safe operating practices will be observed:

- a. Slings shall not be shortened with knots or bolts or other makeshift devices.
- b. Sling legs shall not be kinked.
- c. Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- d. Slings shall be padded or protected from the sharp edges of their loads.
- e. Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.

All slings and associated equipment/attachments will be inspected before use by a competent person and defective items will be tagged out of service.

Hand signals used to guide the crane operator will be consistent with the ANSI standard for the type of crane in use and an illustration of the signals must be posted at the job site. A copy of these hand signals is in our Project Manual.

Care must be taken while actually operating the crane in hoisting applications as well as when relocating the crane superstructure.

The competent person on site will ensure that the flooring or ground on which equipment is to be placed is substantial enough to safely hold the weight of the load and equipment with adequate safety margin.. If the strength of the floor is unknown and/or cannot be determined, a professional engineer will determine the pounds per square foot required and, if necessary, the appropriate shoring to be installed to sustain the weight.

When operating in enclosed spaces, atmospheric testing will be accomplished to ensure clean breathable air. These tests will be recorded and maintained by the safety program administrator.

Know Your Hand Signals!

Basic Standard Hand Signals for Cranes and Hoisting Equipment



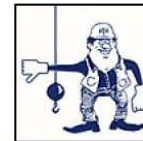
HOIST: With forearm vertical, and forefinger pointing up, move hand in small horizontal circle.



LOWER: With arm extended downward, forefinger pointing down, move hand in a small horizontal circle.



RAISE BOOM: Arm extended, fingers closed, thumb pointing upward.



LOWER BOOM: Arm extended, fingers closed, thumb pointing downward.



EXTEND BOOM: Both fists in front of body with thumbs pointing outward.



RETRACT BOOM: Both fists in front of body with thumbs pointing toward each other.



SWING: Arm extended, point with finger in direction of desired boom swing.



STOP DOG EVERYTHING: Clasp hands in front of body.



MOVE SLOWLY: Use one hand to give any motion signal and place the other hand motionless in front of the hand giving the signal.



TRAVEL: Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



USE MAIN HOIST: Tap fist on head; then use regular signals.



USE WHIP LINE (AUXILIARY HOIST): Tap elbow with one hand; then use regular signals.



STOP: Arm extended, palm down, move arm back and forth horizontally.



RAISE THE BOOM AND LOWER THE LOAD: With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



LOWER THE BOOM AND RAISE THE LOAD: With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



EMERGENCY STOP: Both arms extended, palms down, move arms back and forth horizontally.

Issued:
 Tag # AP2003-M061

Clearheart Construction Co., Inc.

Certification of Crane Inspection & Checklist

CRANE MODEL: _____

DATE: _____

CRANE SERIAL NUMBER: _____

FREQUENT	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Observation of defects as used Continual							
Functional Operating Mechanisms Daily							
Deterioration or leakage in:							
Lines Daily							
Tanks Daily							
Valves Daily							
Drain Pumps Daily							
Any Part of Air or Hydraulic System Daily							
Hooks							
Deformation Daily							
Cracks Daily							
Note: Repair or replace if more than 15 percent of normal throat opening or more than 10° twist from plane of unbent hook							
Hoists, Chains & End Connections							
Excessive Wear Daily							
Twisted Daily							
Distorted Daily							
Stretched Daily							
Rope reeving (See Mfg's Specifications) Daily							
All operating mechanisms for excessive wear Daily							
Rope reeving (See Mfg's Specifications) Daily							
Operator's Initials:							

Code: ✓ = OK X = Deficiency NA = Not Applicable

PERIODIC	
All THE ABOVE ITEMS	Certified Completion: _____
Deformed, Cracked or Corroded Members	
Loose Bolts or rivets	
Cracked or worn sheaves and drums	
Excessive Wear on:	
Brake System Parts	
Linings	
Pauls	
Ratchets	
Improper indicators	
Chains & Sprockets excessive wear	
Power Plant Safety Issues	
Distorted, worn, cracked pins, bearing, shafts, gears, rollers, locking and clamping devices	

All Items inspected in the Periodic Inspection must be certified as having been completed.
 I certify the items noted in the Periodic Inspection have been inspected.

 Safety Program Administrator

 (Date)