

15. Gantry or Stationary Cranes and Hoists

This procedure prescribes the requirements for operational controls to provide guidance on the safe use of crane and hoist equipment to prevent injuries and property damage.

15.01. Definitions:

- 15.01.01. Below the Hook Device: Any device that is attached to the hook of the hoist on one end and attached to the object lifted on the other end, also called rigging.
- 15.01.02. Qualified and Authorized Employee: An employee trained by a qualified and authorized contractor or employee in hoist and crane operation and inspection. A certified employee or contractor has been deemed is one through either certification; education or experience is deemed competent by an employer in the safe use and operation of cranes and hoists.
- 15.01.03. Crane: A machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine.
- 15.01.04. Hoist: A machinery unit that is used for lifting or lowering a freely suspended (unguided) load.
- 15.01.05. Slings: Slings are used in conjunction with other material handling equipment for the movement of material by hoisting. Slings include those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope and synthetic web.

15.02. 12.49. Service Classification

- 15.02.01. Normal service: Service that involves operating at less than 85% of rated load and not more than 10 lift cycle per hour except for isolated instances.
- 15.02.02. Heavy service: Service that involves operating at 85 to 100% of rated load or in excess of 10 lift cycles per hour as a regular specified procedure.
- 15.02.03. Severe service: Service that involves handling load approaching the rated capacity or in excess of 20 lift cycles per hour and or abnormal operating conditions.

15.03. Training

- 15.03.01. Awareness Level: All employees who may be affected by the operation of hoists and cranes shall have awareness level training and periodic re-fresher training.
- 15.03.02. Operator Level: All hoist and crane operators shall be trained, qualified and authorized by a qualified trainer on the inspection, operation and rigging of loads for cranes and hoists. User level training should include both classroom and hands on evaluations.
- 15.03.03. Retraining will occur at periodic intervals (at minimum 3 years) and whenever it appears that personnel should have refresher training. User Level instructors may also be authorized to train by a qualified trainer.

15.04. Inspections

15.04.01. Initial inspection. Refers to the first time a site's crane and hoist equipment has been inspected. An initial inspection shall be conducted before using any new, reinstalled and altered crane to ensure safety and compliance.

15.04.02. Initial inspections elements and operational tests shall include, but are not limited to:

15.04.02.01. lifting and lowering

15.04.02.02. trolley travel

15.04.02.03. bridge travel

15.04.02.04. limit switch, locking and safety devices

15.04.02.05. Load test. Only on new, reinstalled and altered cranes should be load tested prior to initial use, as determined by a qualified and authorized employee or contractor.

15.04.02.06. Any other items determined by a qualified and authorized employee or contractor.

15.05. Daily Inspections

15.05.01. Refers to a reoccurring visual inspection that is performed every day or every shift by the operator if the crane or hoist is used daily. If a crane or hoist is not used daily, it is to be completed prior to operation. Operators shall be trained on how to perform daily inspections.

NOTE: In addition to the daily inspection, operators shall observe cranes, hoists, and riggings during operation to identify defects or safety or operational issues that may occur between inspections.

15.05.02. Daily inspections elements should include, but are not limited to:

15.05.02.01. All functional operating mechanisms.

15.05.02.02. Hooks, chains, slings and other below the hook lifting devices.

15.05.02.03. Any deterioration of the air or hydraulic system.

15.05.02.04. Any other items determined by a qualified and authorized employee or contractor.

15.06. Frequent Inspections

15.06.01. Refers to a recorded examinations by a qualified and authorized employee which frequency should be based on service classification (normal service, monthly; heavy service, weekly to monthly; severe service, daily to weekly.) The frequent inspections shall be completed by a qualified and authorized employee or contractor.

15.06.02. Frequent inspection elements should include, but are not limited to:

15.06.02.01. Operating mechanisms for proper operation, proper adjustment, and unusual sounds

15.06.02.02. Limit device(s)

- 15.06.02.03. Tanks, valves, pumps, lines, and other parts of air or hydraulic systems for leakage or deterioration.
- 15.06.02.04. Hooks and hook latches
- 15.06.02.05. Hoist ropes and end connections
- 15.06.02.06. Running Rope of proper spooling onto the drum(s) and sheave(s).
- 15.06.02.07. Running rope for any deterioration, resulting in loss of original strength.
- 15.06.02.08. Below the hook devices used with the hoist or crane.

15.07. Periodic Inspections

- 15.07.01. Refers to a recorded examinations by a qualified and authorized employee or contractor which frequency should be based on service classification (normal service, yearly; heavy service, yearly; severe service, quarterly).
- 15.07.02. Periodic inspection elements include, but are not limited to:
 - 15.07.02.01. Deformed, cracked or corroded members.
 - 15.07.02.02. Loose bolts or rivets.
 - 15.07.02.03. Cracked or worn sheaves and drums.
 - 15.07.02.04. Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices.
 - 15.07.02.05. Excessive wear on brake system parts.
 - 15.07.02.06. Load, wind, and other indicators over their full range, for any significant inaccuracies.
 - 15.07.02.07. Gasoline, diesel, electric or other power plants for improper performance.
 - 15.07.02.08. Excessive wear of chain drive sprockets and excessive chain stretch.
 - 15.07.02.09. Electric apparatus for signs of pitting or any deterioration of controller contactors, limit switches and pushbutton stations.
 - 15.07.02.10. Slings, chains and other below the hook lifting devices are to be checked for damage and defects.

15.08. Inspection Records

- 15.08.01. Written records are to be maintained for all initial, frequent and periodic inspections. Inspection records will include date of inspection, signature of person performing the inspection, identification number or other identifier of the device inspected and any findings from the inspection.

15.09. Crane and Hoist Safety Design Requirements

- 15.09.01. All crane, hoist and accessory lifting equipment shall meet the following design requirements:

- 15.09.02. All crane and hoist hooks shall have properly functioning safety latches.
- 15.09.03. Pendant control boxes shall be constructed and maintained to prevent electrical shock and shall be clearly marked for identification of functions.
- 15.09.04. Crane bridges and hoist monorails shall be labeled on both sides with the maximum capacity and the label shall be clearly legible from the ground or floor.
- 15.09.05. Each hoist-hook block shall be labeled with the maximum hook capacity, and the label shall be clearly legible from the ground or floor.
- 15.09.06. A device such as an upper-limit switch or slip clutch shall be installed on all building cranes and hoists. A lower-limit switch may be required when there is insufficient hoist rope on the drum to reach the lowest point.
- 15.09.07. All cab and remotely operated bridge cranes shall have a motion alarm to signal bridge movement. The motion alarm shall be used to signal motion.
- 15.09.08. All newly installed cranes and hoists, or those that have been altered, repaired or rebuilt structurally, shall have an initial inspection prior to be placed into service.

15.10. Crane and Hoist Overloading

- 15.10.01. The department shall establish procedures and or processes to ensure that cranes or hoists shall not be loaded beyond their rated capacity. Any crane or hoist suspected of having been overloaded shall be immediately removed from service.
- 15.10.02. Any cranes suspected of having been overloaded shall be inspected, repaired (if altered, repaired or modified, conduct a load test) and approved for use before being returned to service.

15.11. Operating Rules

Operators shall comply with the following rules while operating the cranes and hoists:

- 15.11.01. Do not engage in any practice that will divert your attention while operating the crane or hoist.
- 15.11.02. Where required, assign a single designated signal person before beginning the lift.
- 15.11.03. Respond to signals only from the person who is directing the lift, or any one appointed signal person.
- 15.11.04. OBEY a STOP signal at all times, no matter who gives it.
- 15.11.05. Do not move a load over people. People shall never be placed in jeopardy by being under a suspended load. Nobody shall ever work or be located under a suspended load.
- 15.11.06. A crane or hoist operator shall remain at the controls while the load is suspended.
- 15.11.07. Ensure that the rated load capacity of a crane's bridge, individual hoist, or any sling or rigging is not exceeded. Know the weight of the object being lifted.
- 15.11.08. 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.

- 15.11.09. Cranes shall not be used for side pulls.
- 15.11.10. 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.
- 15.11.11. The hoist chain or rope shall be free from kinks or twists and shall not be wrapped around the load.
- 15.11.12. The load shall be attached to the load block by means of rigging or other approved devices.
- 15.11.13. The sling and load shall clear all obstacles and shall be evaluated to determine such clearance before hoisting, lowering, or movement.
- 15.11.14. Never use a hoist or crane to lift personnel.

15.12. Moving a Load

Operators shall comply with the following rules while moving a load using cranes and hoist equipment:

- 15.12.01. 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.
- 15.12.02. The hook shall be brought over the load in such a manner as to prevent swinging.
- 15.12.03. The hoist limit switch which controls the upper limit of travel of the load block shall never be used as an operating control.
- 15.12.04. Two or more cranes shall not be used to lift a load unless a competent person is placed in charge of the operation. The competent person shall, in advance of the operation, analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and movements to be made, in addition to all safety measures to be taken.
- 15.12.05. Use a tag line when loads shall traverse long distances or shall otherwise be controlled. Manila rope may be used for tag lines.
- 15.12.06. Plan and check the travel path to avoid personnel and obstructions.
- 15.12.07. Ensure that the hoist rope or chain is not damaged or kinked.
- 15.12.08. Ensure that multiple part lines are not twisted around each other.
- 15.12.09. If the load being lifted approaches the rated load for the crane or hoist, test the brakes by raising the load a few inches and applying the brakes.
- 15.12.10. The load shall not be lowered below the point where less than two full wraps of rope remain on the hoisting drum.
- 15.12.11. Lift the load only high enough to clear the tallest obstruction in the travel path.
- 15.12.12. Start and stop slowly, and ensure that there is no sudden acceleration or sudden stop of the moving load.

- 15.12.13. Choose a safe landing area. Land the load when the move is finished.
- 15.12.14. 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. An attendant shall remain at the work site until the load can be safely lowered and to maintain safe control of the site.
- 15.12.15. Hoisting, lowering, or traveling is prohibited while any employee is on (or in immediate proximity of) the load or hook.

15.13. Rigging Loads

- 15.13.01. Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary to ensure that it is in serviceable condition. Defective rigging equipment shall be tagged and removed from service.
- 15.13.02. Rigging equipment not in use shall be removed from the immediate work area to eliminate the hazards it may create for other employees.
- 15.13.03. All employees shall keep clear of loads that are about to be lifted as well as suspended loads.
- 15.13.04. Operators shall comply with the following rules while rigging cranes and hoist equipment:
 - 15.13.04.01. Determine the weight of the load.
 - 15.13.04.02. Determine the proper size and capacity for slings and components. Review angle capacity according to mode of use (basket, vertical, choke).
 - 15.13.04.03. Do not use manila rope (natural fiber rope) for rigging. Use only proper rigging materials and equipment.
 - 15.13.04.04. Make sure that shackle pins and shouldered eye bolts are installed in accordance with the manufacturer's recommendations.
 - 15.13.04.05. Use safety hoist rings (swivel eyes) as a preferred substitute for eye bolts wherever possible.
 - 15.13.04.06. Pad sharp edges to protect slings.
 - 15.13.04.07. Wood, tire rubber, or other pliable materials may be suitable for padding. Use only proper padding materials.
 - 15.13.04.08. Do not use slings, eye bolts, shackles, or hooks that have been cut, welded, repaired, or brazed.
 - 15.13.04.09. Install wire-rope clips with the base only on the live end (load side) and the U-bolt only on the dead end (no-load side). Follow the manufacturer's recommendations for the spacing for each specific wire size.
 - 15.13.04.10. Determine the center of gravity and balance the load before moving it.
 - 15.13.04.11. Initially lift the load only a few inches to test the rigging and balance.
 - 15.13.04.12. 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 shall be observed:

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

15.14. Working Under Loads is Strictly Prohibited

- 15.14.01. All loads shall be rigged by a certified rigger.
- 15.14.02. Routes for suspended loads shall be pre-planned to ensure that no employee is required to work directly below a suspended load.

15.15. Hoisting

- 15.15.01. All control mechanisms for maladjustments.
- 15.15.02. Control and drive mechanism for excessive wear of components and contamination.
- 15.15.03. Crane safety devices.
- 15.15.04. Air, hydraulic, and other pressurized lines and systems for condition.
- 15.15.05. Hooks and latches for deformation, chemical damage, cracks, or wear.
- 15.15.06. Wire rope travel and attachment.
- 15.15.07. Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, or moisture accumulation.
- 15.15.08. Ground conditions.
- 15.15.09. Leveling.
- 15.15.10. Only a qualified person can inspect the rigging.

15.16. Crane - Hoist Daily Checklist Form and the Crane - Hoist Frequent Inspection Form can be found in the Appendices of this program manual.