Overhead Crane Safety – Quick Tips

A crane is a machine used for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Overhead cranes are used in many industries to move heavy and oversized objects that other material handling methods cannot. Overhead cranes have a railed support structure, known as a bridge, and a wheeled trolley that travels across the bridge horizontally. The other primary component of an overhead crane is the hoist, that's attached to the trolley, and is used to perform the lifts. Several varieties of overhead cranes exist including gantry, semi-gantry, cantilever gantry, storage bridge and wall cranes.

Overhead crane safety is regulated by the Occupational Safety and Health Administration (OSHA) in 29 Code of Federal Regulations (CFR) 1910.179. This regulation covers overhead and gantry crane general requirements, design, inspection, maintenance requirements and operations.

General Requirements

- All overhead and gantry cranes installed after August 31, 1971, must meet the specifications of the American National Standard Institute (ANSI) / American Society of Mechanical Engineers (ASME) Safety Code for Overhead and Gantry Cranes, ANSI B30.2.0-1967 which is incorporated by reference as specified in 29 CFR 1910.6(e)(19) and was last updated in 2016
- Cranes can be modified and load capacity rerated as long as the modifications and associated structure is thoroughly checked for the new rated load by a qualified engineer or the equipment manufacturer
- The rated load of the crane must be plainly marked on each side of the crane – if more than one hoist is present, each hoist must have its rating shown
- Clearance must be maintained above and to the side of cranes
- Walkways cannot be placed in a crane operating zone that would compromise employee safety when the crane is in operation
- Parallel cranes must have adequate clearance between the two bridges if no walls or structures are between them
- Only designated personnel are permitted to operate a crane

Design Requirements

OSHA specifies design requirements on the construction of the cab and its controls as well as the cab's lighting; foot-walks, ladders and stairways; bridge and trolley bumpers; hoist, holding, trolley and bridge brakes; electrical components; hoisting equipment; and warning devices.

Inspection Requirements

Due to the size and weight of the objects often being lifted and transported by

overhead cranes, routine inspections are necessary to ensure continued safe operation. An initial inspection of the crane (new or altered) prior to initial use is required. Once placed into service, overhead cranes require two different types of inspections. Frequent inspections are done daily to monthly, while periodic inspections are completed at monthly to annual intervals. The purpose of the two inspection types is to examine critical components of the crane and to determine the extent of wear, deterioration or malfunction.

Frequent Inspections

Items to be Inspected	*Frequency*
Functional operating mechanisms for maladjustment	Daily
Deterioration or leakage in lines, tanks, valves, drain pumps and other parts of air or hydraulic systems	Daily
Hooks with deformation or cracks (visual)	Daily
Hooks with deformation or cracks (written record with signature of inspector and date)	Monthly
Hoist chains and end connections for excessive wear, twist or distortion interfering with proper function, or stretch beyond manufacturer's recommendations (visual)	Daily
Hoist chains and end connections for excessive wear, twist or distortion interfering with proper function, or stretch beyond manufacturer's recommendations (written record with signature of inspector and date)	Monthly
Running Rope and end connections for wear, broken strands, etc. (written record with signature of inspector, rope identity and date)	Monthly
Functional operating mechanisms for excessive wear	Daily to Monthly
Rope reeving according to manufacturers' recommendations	As recommended

Periodic Inspections

Items to be inspected:

- Deformed, cracked or corroded members
- Loose bolts or rivets
- Cracked or worn sheaves and drums
- Worn, cracked or distorted parts, such as pins, bearings, shafts, gears, rollers, locking and clamping devices.
- Excessive wear on brake-system parts, linings, pawls and ratchets
- Inaccuracies in load, wind and other indicators
- Electric , gasoline, diesel, or other types of motors for improper performance
- Excessive wear of chain drive sprockets and excessive chain stretch
- Deteriorated electrical components, such as pushbuttons, limit switches or contactors

In addition to the initial inspection, OSHA also requires that all new and altered crane-functions are tested for:

- Hoisting and lowering
- Trolley travel
- Bridge travel
- Limit switches, locking and safety devices

Maintenance Requirements

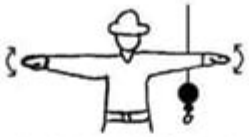
A preventive maintenance program based on the crane manufacturer’s recommendations must be implemented. If any deteriorated components or unsafe conditions are detected during the required inspections, they must be completed before the crane is allowed to be used. Only designated personnel may perform the required maintenance and repairs. The requirements of 29 CFR 1910.147, the control of hazardous energy or lockout/tagout, should be used to de-energize the crane (See Quick Tips #170: Lockout/Tagout for more information).

Operation

The manufacturer’s instructions must be followed when operating to help ensure overhead crane safety. OSHA covers load handling requirements under 1910.179(n) and addresses the following:

- Size of load
- Attaching the load
- Moving the load
- Hoist limit switch

Standard Hand Signals for Controlling Overhead and Gantry Cranes

 **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.

Commonly Asked Questions

Q: Where are the standards for crane signals located?

A: The signals do not appear in 29 CFR 1910.179 but are referenced in 29 CFR Part 1926 Subpart CC Appendix A and ANSI/ASME B30.2-2016 They are shown above.

Q: Do standards exist for other types of cranes?

A: Yes, several. OSHA 29 CFR Subpart N contains regulations for: overhead and gantry cranes(1910.179), crawler/locomotive and truck cranes (1910.180), and derrick cranes(1910.181) The ANSI/ASME B30 series of standards cover a wide variety of machines used to lift and move loads, which now include storage and retrieval machines, scrap and material handlers, material placement systems, and balance lifting units.

Sources

29 CFR 1910.179, Overhead and Gantry Cranes
29 CFR 1910.6 Standards Incorporated by Reference
29 CFR 1910.147 The Control of Hazardous Energy or Lockout/Tagout
29 CFR 1926 Subpart CC Standard Hand Signals for Controlling Overhead and Gantry Cranes
OSHA Hand Signals for Crane Operation
ANSI/ASME B30.2-2011, Overhead and Gantry Cranes