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14.0 MOBILE CRANES

14.1 SCOPE

This chapter applies to the construction and characteristics, inspection, testing, maintenance and operation of crawler cranes, locomotive cranes, and wheel-mounted cranes, and other crane types that retain the same fundamental characteristics. This scope includes only cranes of the above type that are powered by internal combustion engines or electric motors. The proper and safe use of these crane types is governed by the American Society of Mechanical Engineers (ASME) standards and the Occupational Safety and Health Administration (OSHA) regulations. This chapter implements required criteria from DOE/RL-92-36 and the applicable national standards and/or federal specifications that are mandatory per ASME B30.5-2007-Mobile and Locomotive Cranes, OSHA 29 CFR 1910.180 Crawler locomotive and truck cranes, and OSHA 29 CFR 1926.550 Cranes and Derricks, as follows:

14.2 GENERAL REQUIREMENTS

Contractors shall access ASME via one of the following options:

1. IHS Engineering Standards, Regulations and Technical Specifications at <http://www.ihs.com/> . The contractor must have paid for access to the specific standard. For access contact The Hanford Technical Library, 277 University Dr, Richland, WA (372-7430). To print IHS files go to <http://www.ihs.com/>
2. To purchase standards directly from ASME go to <http://www.asme.org>
3. To access OSHA standards go to the following links
 - 29 CFR 1910.180 Crawler Locomotive and Truck Cranes
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9831
 - 29 CFR 1926.550 Cranes and Derricks
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10760

14.3 IMPLEMENTATION

Contractors shall be compliant to OSHA, ASME, DOE/RL-92-36 and the mobile or locomotive crane manufacturers' requirements. It is the responsibility of the user of this manual to implement all of the requirements from listed sources. When two standards set forth inconsistent requirements, the user shall adhere to the standard containing the most stringent requirements. ASME standards provide the most comprehensive information. Users should contact a Hanford Hoisting Rigging Committee (HHRC) representative or send an email to ^Hanford Hoisting and Rigging for a formal interpretation. See Chapter 17.0 for process to be followed when requesting an interpretation. Notify the Hanford Site Hoisting and Rigging Committee if any inconsistent standards are identified.

It is not the intent of this manual to require retrofitting of existing equipment. However, when any hoisting or rigging equipment is modified, its performance requirements shall be reviewed relative to the requirements within the current manual. The need to meet the current requirements shall be evaluated by a qualified person selected by the owner (user). Recommended changes shall be made by the owner (user) within 1 year.

14.4 INCONSISTENT STANDARDS

The Hanford Hoisting and Rigging Manual (HHRM) Chapter 2 Responsibilities, delineates responsibilities to personnel and organizations involved in hoisting and rigging as does ASME B30.5-2007. The HHRM will take precedence over ASME B30.5-2007. If the responsibility is not covered or assigned in the HHRM then ASME B30.5-2007 applies.

14.5 HANFORD SPECIFIC REQUIREMENTS AND PRACTICES

Follow ASME B30.5 requirements and the following Hanford requirements:

14.5.1 CAUTION: Ground and Bearing-Pressure Considerations.

It is important to ensure that no underground installations exist that could be compromised, such as electrical vaults, conduit banks, tanks, and piping. When crane load foundations and bearing pressure are a concern to crane stability and underground installation integrity, site utility layout, crane manufacturer's ground-loading information, crane configuration, and load and travel path information shall be evaluated and analyzed by a qualified person. The qualified person shall determine if ground scans, soil stability tests, and structural analysis of underground structures is necessary. If analysis is performed, a documented plan to ensure crane stability and integrity of underground installations shall be provided to the supervisor of the lift operation and discussed with involved or affected personnel.

14.5.2 Operating Cranes Near Energized Transmitters or Electrical Power lines Require Notification Before Work.

A minimum of 48 hours before commencement of operations near electric power lines, notify the electrical utility for an onsite meeting to establish conditions to safely complete the operations. See **Attachment 14.1** for an example of an *Electrical Utilities Site Visit Form*. Notify electrical utilities (EU) prior to beginning work activities when EU requests notification. In addition to verifying that the conditions have not changed from the time of the original Site Visit, the notification allows EU to become aware of the physical location of the work activities which could expedite outage response/recovery if inadvertent contact were to occur. Electrical Utilities Control Dispatch Center is manned during normal 8x9s work hours. It's preferable to notify Electrical Utilities the day of the job; however, if the work is scheduled for off-shift hours, EU should be notified before the end of the last business day prior to the work activities beginning.

1. Electrical utilities site visit shall as a minimum establish:
 - The expiration date of the site visit
 - The location of the work activity
 - If the site visit is for transit or work near energized lines
 - Voltage of the lines and distance restrictions
 - Type of equipment to be used-(cranes-track hoes etc.)
 - Indicate if Utilities notification in person or by phone is required before the work activity begins.
 - If an authorized electrical worker is required to be present (or on site) during the work activity.
 - The names and signature of Utilities representative, Requesting organizations' representative or project management representative and Representative of the personnel who will be directing and operating the equipment shall be on the site visit form.

- The electrical utility points of contact are:
 - Hanford Electrical Utilities Control Dispatch Center - Building 251W, telephone 373-7753 or 373-2321
 - City of Richland Dispatch Center - telephone 943-4428.
- 2. The specified clearance between the power lines and the crane, load line, and load shall be maintained at all times as specified in **Table 14-1** and shown in **Figure 14-1**.
- 3. Load control, when required, shall utilize tag lines of a nonconductive type. (A recommended choice for a nonconductive tag line is dry rope made of polypropylene or polyethylene fiber.)
- 4. A qualified signaler, whose sole responsibility is to verify that the required clearance is maintained, shall be in constant contact with the crane operator.

Before commencement of operations near a transmitter tower, notify Hanford Network Maintenance (HNM) a minimum of 48 hours in advance for an onsite meeting to establish conditions to safely complete the operations. Prior to beginning the work activity, when required by HNM, notify Hanford Network Maintenance in person or by phone the day the work activity will take place to re-establish the location, equipment and working conditions. The Network Maintenance point of contact is:

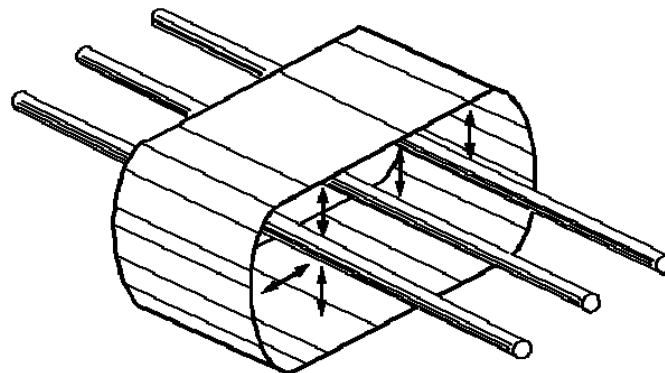
Hanford Network Maintenance 1100 Area, Building MO-404, telephone 376-0789

Table14-1. Safe Working Distance from Power Lines.

a. When operating near high-voltage power lines	
Normal voltage (phase to phase)	Minimum Required Clearance
Up to 50 kV	10 ft (3.1 m)
Over 50 kV to 200 kV	15 ft (4.6 m)
Over 200 kV to 350 kV	20 ft (6.1 m)
Over 350 kV to 500 kV	25 ft (7.6 m)
Over 500 kV to 750 kV	35 ft (10.7 m)
Over 750 kV to 1000 kV	45 ft (13.7 m)

b. While in transit with no load and boom or mast lowered:	
Normal voltage (phase to phase)	Minimum Required Clearance
Up to 0.75 kV	4 ft (1.2 m)
Over 0.75 kV to 50 kV	6 ft (1.8 m)
Over 50 kV to 345 kV	10 ft (3.1 m)
Over 345 kV to 750 kV	16 ft (4.9 m)
Over 750 kV to 1000 kV	20 ft (6.1 m)

Figure 14-1. Minimum Radial Distance of Prohibited Zone for Cranes Operating Near Electrical Lines.



14.5.3 Adverse Weather

Adverse weather conditions such as but not limited to wind, wind gusts, rain, snow and extreme temperatures, etc. that may inhibit the operator's or the equipment's ability to safely handle loads, shall be evaluated by supervision and crane operator prior to any lifting operation. Limitations and conditions imposed by equipment manufacture for adverse weather shall be implemented. Mobile crane operations shall be suspended when lightning is within 50 miles of the work location, as determined by the Hanford Meteorological Station. The Hanford Meteorological station can be contacted @ (509) 373-2716.

14.5.4 Rigging Requirements

Caution: Working on or under a suspended load is prohibited, except when the load can be supported by blocking or cribbing, can be securely braced, or can be supported substantially by some other means that would prevent the load from moving. Some loads being lifted and set in place may require special handling control measures such as inspecting, landing, setting, or controlling the load, that may require personnel to position their hands or other body parts under the load when no other method is feasible. These special handling control activities **MUST BE APPROVED** by management and industrial safety **PRIOR TO BEING PERFORMED**.

14.5.5 Swing Radius–Pinch Point Clearance

When the crane is in operation, maintain a minimum clearance of 30 inches (76 centimeters) between the swing radius of the crane superstructure or counterweights and any stationary object. When this clearance cannot be maintained, isolate pinch point hazards with barricades or safeguards. Where possible, flag or barricade the swing radius.

14.5.6 Load Test Weight

The weight of the test loads used on site must be accurately known within a tolerance of +0 percent to -5 percent, traceable to a recognized standard or verified by engineering calculations. **Note:** *The Crane Load Stability Test Code*, SAE J765, describes a test on new cranes done by the crane manufacturer or the manufacturer's testing agency. Load test shall never be less than the minimum requirements defined in applicable ASME B30.5-2007 Standard. Any one of the following options will meet this requirement:

1. Use a calibrated (+0 percent, -5 percent) load-measuring device during the load test.
2. Determine the test load with a calibrated load-measuring device before the test.
3. Calculate the test load based on known unit weights and dimensions of the test fixture. Dimensions and calculations must be checked (signed and dated) by a qualified engineer and determined to be accurate within tolerance (+0 percent, -5 percent).

14.5.7 Load-Test Report

After the test is completed, the load-test report shall be signed and dated by the person in charge of conducting the load test. The person in charge shall ensure that the test is placed in the maintenance file.

14.5.8 Crane Maintenance Files

The crane maintenance file is a compilation of various documents and records relating to operation, maintenance, inspection, testing, evaluating and repair of the equipment. The file may be centrally located or proportioned into satellite holding areas. The method(s) selected for establishing adequate information retention shall be determined by the equipment custodian. It is

expected that the maintenance files be retrievable within three work days. The equipment custodian is responsible for ensuring that a safe and reliable maintenance program is in place.

14.5.8.1 Intent of Crane Maintenance Files

The crane maintenance file shall contain, as a minimum, the required current dated periodic inspection records and other documentation to provide the user with evidence of a safe and reliable maintenance program. Inspection records should be retained in a format and location that provides for ease in accessibility. Maintenance file information should provide a source for comparing present conditions with past conditions to determine whether existing conditions show a trending pattern of wear, deterioration, or other comparable factors that may compromise safe, continued use of the equipment. Length of record retention shall be determined by the equipment custodian's established maintenance program.

14.5.8.2 Maintenance File Contents

Crane maintenance files shall contain the following documentation, as applicable, and should be retained as long as the crane is assigned to a Hanford Site DOE contractor:

1. Monthly and periodic inspection records (The most recent records shall be retained in the file and the past records should be retained for trending.)
2. Load test reports
3. Operational test reports
4. Documentation of altered, replaced, or repaired load-sustaining parts
5. Records of special inspections on safety-related items such as brakes, crane hooks, ropes, hydraulic and pneumatic cylinders, and hydraulic and pneumatic relief pressure valves.
6. Copies of waivers, exemptions, hostile environment plans, or similar documentation applicable to the crane (to include manufacturer's safety bulletins, safety alerts, and Product recall information)
7. Documentation for replacement ropes (see Chapter 8.0, "Wire Rope")
8. Wire rope manufacturer's certification for replacement ropes
9. Records of inspection on load indicating devices, anti-two block, two-block warning, and two-block damage prevention systems.

14.5.8.3 Previously Owned Cranes Maintenance Files

Although complete maintenance information for previously owned cranes may not be available, the equipment custodian shall acquire as much of the pertinent information as possible. If efforts fail to obtain the required information, the following actions, at a minimum, must take place.

- Perform a periodic inspection by a qualified inspector, including inspection of hooks and wire ropes.
- Inspect for evidence of past repairs, alterations, or modifications. Note the results of this inspection on the inspection report.
- Resolve deficiencies noted by the inspector before placing the crane into service. Perform repairs and retests as needed. If there is evidence of past repairs, replacement, or alterations of load-bearing parts and load test records are unavailable, a load test shall be performed in accordance with DOE/RL-92-36, *Hanford Site Hoisting and Rigging Manual* Section 14.5.6.

Attachment 14-1 Electrical Utilities Site Visit Sample Form

ELECTRICAL UTILITIES SITE VISIT FORM

Customer Contact: _____ Phone Number: _____

Scheduled Date: _____ CACN: _____

Location: _____

Line(s) Number: _____ Package Number(s): _____

Voltage Level(s) Communication 120/240/460 V 2400 V 7200 V
 13.8 kV 115 kV 230 kV

Safe Working Distance Clearance		Transit & Secured	
Communication Line	No Contact	Communication Line	No Contact
50 V to 50 kV	10 feet	50 V to 750 V	4 feet
50 kV to 200 kV	15 feet	750 V to 50 kV	6 feet
200 kV to 350 kV	20 feet	50 kV to 345 kV	10 feet

Crane & Rigging Activities

Must comply with requirements of both DOE/RL-92-36, *Hanford Site Hoisting and Rigging Manual*, and HNF-RD-28954, *Equipment Operation Near Overhead Electrical Lines*.

(14.5.2) Power lines energized: Although not planned, crane or Load has capability, if fully extended to break into the Prohibited Zone. Must comply with referenced documents, including:

- * Completion of Site Visit Form
- * Identification/description of aerial lines and voltages
- * A qualified spotter whose sole responsibility is to verify Required clearance is maintained.

OR Power lines energized: Crane **will be** working within the Prohibited Zone. **Shall be avoided and only used as a last resort** when no other alternative exists. Must comply with referenced documents, including:

- * Completion of Site Visit Form
- * Identification/description of aerial lines and voltages
- * Meeting with EU representative and customer to establish a new minimum clearance boundary and actions for safe Operation
- * _____ new clearance boundary
- * Dispatch Center will be manned.

Vehicular and Mechanical Equipment Operations (e.g., cranes, trackhoes, forklifts, excavators, dump trucks, oversized loads, etc) that have potential of contacting communication lines or entering the Limited Approach Boundary for energized lines **MUST** comply with requirements of HNF-RD-28954, *Equipment Operation Near Overhead Electrical Lines*, including having a minimum of two controls to prevent inadvertent equipment contact with the lines.

Recommendations

- Lines/equipment deenergized/grounded. Isolation Points: _____
- Lineman Standby: Raise Line
- Insulated Barriers Reclosures Off
- No Support Needed
- * Dispatcher on-duty
 - * Only requested by qualified Lineman
- Other: Describe _____

NOTE: Insulated lifting devices are required to be used for all work being performed on Electrical T&D system.

EU Representative _____ Date: _____
 Print/Signature

Customer Representative _____ Date _____
 Print/Signature

Site Visit Date: _____ (Visit form expires 60 days from signature date) Faxed to Dispatcher

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