Cranes & Derricks in Construction
29 CFR 1926 Subpart CC

OSHA Update
AIHA/ASSE
September 17, 2010
Cranes and Derricks in Construction
29 CFR 1926 Subpart CC

Effective Date - November 8, 2010
Important Dates

• Published – August 9, 2010
• Effective – November 8, 2010
  – Qualified
    • Riggers
    • Signal persons
    • Maintenance & repair employees
  – State/local licensed operators
• Certification option for operators
  – Within four years (August 9, 2014)
Topics

- Scope
- Ground Conditions
- Assembly/Disassembly
- Power Line Safety
- Inspections
- Safety Devices
- Operational Aides
- Operations
- Signals
- Fall Protection
- Operator Certification/Qualification
- Tower Crane (supplemental requirements)

Not comprehensive – Only some highlights!
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<td>Operator Qualification and</td>
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</tbody>
</table>
What is Covered?

• Functional Description
  – Equipment which can:
    • Hoist,
    • Lower, *and*
    • Horizontally move a suspended load

• Includes, but is not limited to, the following:
1. Articulating cranes (such as knuckle-boom cranes)
2. Crawler cranes
3. Floating cranes
4. Cranes on barges
5. Locomotive cranes
6. Mobile cranes (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted, and boom truck cranes)
7. Multi-purpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load
8. Industrial cranes (such as carry-deck cranes); dedicated pile drivers; service/mechanic trucks with a hoisting device
9. Cranes on a monorail
10. Tower cranes (such as fixed jib, “hammerhead boom”, luffing boom and self-erecting)
11. Pedestal cranes
12. Portal cranes
13. Overhead and gantry cranes
14. Straddle cranes
15. Side-boom tractors
16. Derricks

…and Variations of Such Equipment
Additionally

• **Limited Requirements for:**
  – Capacity: 2000 pounds or less
  – Dedicated pile drivers
  – Overhead and gantry cranes
  – Side-boom tractors

• **Supplemental Requirements for:**
  – Tower cranes
  – Derricks
  – Floating cranes/derrick & land cranes/derricks on barges

• **17 Specific Exclusions**
  – Backhoes, etc. (next slide)
<table>
<thead>
<tr>
<th></th>
<th>Machinery converted to non-hoisting/lifting</th>
<th>PITs unless configured with winch/hoist</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Power shovels, excavators, wheel loaders, backhoes, loader backhoes, track loaders (even if using chains, slings or other rigging to lift suspended loads)</td>
<td>Mechanics truck when hoisting for equipment maintenance/repair</td>
</tr>
<tr>
<td>3.</td>
<td>Auto wreckers, tow trucks when used to clear wrecks/haul vehicles</td>
<td>Come-a-long or chainfall hoists</td>
</tr>
<tr>
<td>4.</td>
<td>Digger derricks used to auger holes &amp; place poles for electric &amp; telecomm, &amp; moving material onto poles</td>
<td>Dedicated drilling rigs</td>
</tr>
<tr>
<td>5.</td>
<td>Aerial lifts</td>
<td>Gin poles used for erecting comm towers</td>
</tr>
<tr>
<td>6.</td>
<td>Telescopic/hydraulic gantries</td>
<td>Tree trimming &amp; removal work</td>
</tr>
<tr>
<td>7.</td>
<td>Stacker cranes</td>
<td>Tree trimming &amp; removal work</td>
</tr>
<tr>
<td>8.</td>
<td>Aerial lifts</td>
<td>Anchor handling or dredge-related ops with a vessel or barge using an affixed A-frame</td>
</tr>
<tr>
<td>9.</td>
<td>Telescopic/hydraulic gantries</td>
<td>Roustabouts</td>
</tr>
<tr>
<td>10.</td>
<td>Stacker cranes</td>
<td>Helicopter cranes</td>
</tr>
<tr>
<td>11.</td>
<td>Dedicated drilling rigs</td>
<td>Material delivery</td>
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<td>1926.1400(c)</td>
</tr>
</tbody>
</table>
Ground Conditions
Ground Conditions (cont’d)

• **Controlling Entity:**
  - Must provide adequate conditions
    • Firm, drained and graded
    • Sufficient to support crane (in conjunction with blocking, mats, etc.)
Ground Conditions (cont’d)

• **Controlling Entity:**
  – Must inform user and equipment operator of known underground hazards (voids, utilities, etc.)
    • Site drawings
    • As-built drawings
    • Soil analyses
  – Known
    • In possession of documents
    • Aware of

1926.1402
Ground Conditions (cont’d)

• If no Controlling Entity:
  – Employer with authority to make/arrange site ground preparations assumes responsibility

• If assembly/disassembly (AD) director or operator determines ground conditions inadequate
  – That person’s employer must confer with controlling entity to ensure ground conditions are made adequate
Assembly/Disassembly
Assembly/Disassembly (cont’d)

- Observe all manufacturer prohibitions AND
- Follow either:
  - Manufacturer procedures
  or
  - Employer procedures (criteria requirements)
Assembly/Disassembly (cont’d)

- **Assembly/Disassembly Director**
  - Must be a competent and qualified person

- **Competent**
  - Capable of identifying existing & predictable hazards related to the subject
  - Has the authority to take prompt corrective measures

- **Qualified**
  - *Through*
    - Recognized degree, certificate, or professional standing
    - Extensive knowledge, training & experience
  - *has*
    - Demonstrated ability to solve/resolve problems related to subject
Assembly/Disassembly (cont’d)

• Assembly/Disassembly Director Must
  – Understand procedures
  – Review procedures (unless understands & has previously used for same type/configuration of equipment)
  – Check that crew members understand their tasks and hazards
  – Follow manufacturer’s prohibitions
  – Ensure all rigging work is by a Qualified Rigger
  – When using outriggers, ensure fully extended or deployed per the load chart
12 Key Hazards A/D Director must address:

1. Adequate site and ground conditions
2. Sufficient blocking for load and stability
3. Suitable boom and jib pick points
4. Identify center of gravity
5. Stability for pin removal
6. Consider wind speed and weather
Assembly/Disassembly (cont’d)

12 Key Hazards (continued):

7. The suitability of blocking material
8. Verification of the loads for assist cranes
9. Snagging of cables or components
10. Struck by counterweights
11. Boom hoist brake failure
12. Loss of backwards stability
Power Line Safety
Power Line Safety (cont’d)

• Step 1: Identify Work Zone
  – Demarcate boundaries
    • Flags or
    • Range limit device or
    • Range control warning device
      and
    • No operation outside zone

OR

– 360 degrees around crane, up to equipment’s maximum working radius
Could you get within 20’ (up to 350 kV) or 50’ (over 350 kV) of a power line?

**YES**

**Option #1**
Deenergize & Ground

**Option #2**
20 or 50-foot Clearance

**Option #3**
Ask Utility for Voltage and Use Table A (with minimum clearance distance)

**Encroachment Prevention Measures**

- Planning Meeting
- If Tag Lines are Used, They Must be Nonconductive
- Elevated Warning Lines, Barricades, or Line of Signs

**PLUS (Choose One):**

- Proximity Alarm, Spotter, Warning Device, Range Limiter, or Insulating Link

**NO**

No Further Action
<table>
<thead>
<tr>
<th>Voltage (nominal, kV, alternating current)</th>
<th>Minimum Clearance Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 50</td>
<td>10</td>
</tr>
<tr>
<td>over 50 to 200</td>
<td>15</td>
</tr>
<tr>
<td>over 200 to 350</td>
<td>20</td>
</tr>
<tr>
<td>over 350 to 500</td>
<td>25</td>
</tr>
<tr>
<td>over 500 to 750</td>
<td>35</td>
</tr>
<tr>
<td>over 750 to 1000</td>
<td>45</td>
</tr>
<tr>
<td>over 1000</td>
<td>(as established by the power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)</td>
</tr>
</tbody>
</table>
Intentionally Working Closer Than Table A Zone

**Must Show:**
- Staying Outside Zone is Infeasible
- Infeasible to Deenergize and Ground

**All of the following are required:**

1. Power Line Owner or Qualified RPE – **Provides Minimum Approach Distance**
2. Planning meeting w/ owner or RPE – Procedures
3. Deactivate automatic re-energizer if so designed
4. Dedicated spotter with visual aids
5. Elevated warning line or barricade
6. Insulating link/device
7. Nonconductive rigging
8. Range limiter (if equipped)
9. Nonconductive tag line (if used)
10. Barricades - at least 10 feet from equipment
11. Limit access to essential employees
12. Ground crane
13. Install insulating line hose or cover-up – utility
## Crane Inspections

<table>
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<th>Type of Inspection:</th>
<th>Who Inspects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified or Repaired/Adjusted</td>
<td>Qualified</td>
</tr>
<tr>
<td>Post-assembly</td>
<td>Qualified</td>
</tr>
<tr>
<td>Shift</td>
<td>Competent</td>
</tr>
<tr>
<td>Monthly</td>
<td>Competent</td>
</tr>
<tr>
<td>Annual</td>
<td>Qualified</td>
</tr>
</tbody>
</table>
Crane Inspections (cont’d)

• **Shift**
  – Visual inspection for apparent deficiencies
  – Does not require documentation (but recommend)

• **Monthly**
  – Inspected per shift inspection criteria
  – Documentation required
    • Items checked & results
    • Name, signature of inspection & date
  – Retain for 3 months

• **Annual**
  – Minimum every 12 months
  – Comprehensive (disassembly as necessary)
  – Retain at least 12 months
Wire Rope Inspections

• **Shift**
  – Visual inspection of *rope likely to be in use* for apparent deficiencies
    • Category I – competent person determines if hazard
    • Category II – approved by mfr for use, replaced, or shortened
    • Category III – replaced or shortened
  – Does not require documentation (but recommend)

• **Monthly**
  – Inspected per shift inspection criteria
  – Documentation required
    • Items checked & results
    • Name, signature of inspector & date
  – Retain for 3 months

• **Annual**
  – Minimum every 12 months
  – Comprehensive of *entire rope*
  – Retain at least 12 months
Safety Devices

• Safety Devices
  – Required
  – *Operational At All Times*
• Include:
  – Crane level indicator
  – Boom/Jib stops (except Derricks)
  – Foot pedal locks
  – Integral holding device/check valve for outrigger jacks
  – Rail clamp/stops if on rails (except portal cranes)
  – Horn
Operational Aids

• Operational Aids
  – Required
  – Except
    • Articulating cranes
    • Digger cranes if mfg after 11/8/11

  *but*
  – Temporary alternative measures are allowed while being repaired

• Temporary Alternatives
  – Boom hoist/luffing jib limiting device
    • Boom/job angle indicator or
    • Mark the boom/jib hoist cable
  – Anti two-blocking device
    • Mark the cable
Operational Aids (cont’d)

• Replacement of Parts:
  – Category I
    • Repaired within 7 days
  – Category II
    • Repaired within 30 days

Exception: unless employer has documented it ordered parts then repaired within 7 calendar days of receipt
Operations

• Comply with manufacturer procedures or

• If no manufacturer procedures:
  – Employer must develop procedures for:
    • Safe operations
    • Operational controls
      – Developed qualified person
    • Capacity
      – Developed and SIGNED By RPE
Operations

• Procedures must be in cab
  – If electronic only, and electronics fail, must cease immediately or follow safe shut-down procedures

• Distracted operator clause
  – no cell phone unless used for signaling

• Rated capacity
  – Can’t exceed
  – Operator must verify weight of load
Signals
Signals

• **Signal Person - When Required:**
  - Point of operation not in full view of operator
  - View of direction of travel is obstructed
  - Site specific safety concerns

• **Signal Types:**
  - Hand, voice, audible or “new”
  - Only time an operator can use a cell phone while lifting
Hand Signals

• Hand Signals
  – Standard Method (Appendix A)
  – Exceptions:
    • Not feasible
    • Operation/attachment not covered by Standard
  – Non-Standard
    • Must be agreed upon before lift
Fall Protection

• Part CC has its Own Fall Protection Requirements

• Training Requirement Ties Back to Subpart M

• Subpart M Reference to Anchor Points
Fall Protection
Required at Unprotected Side or Edge

• During Assembly/Disassembly
  – More than 15’
  – Except:
    • At or near draw-works (when equipment is running)
    • In the cab
    • On the deck
Fall Protection
Required at Unprotected Side or Edge

• Not Performing Assembly/Disassembly
  – More than 6’:
    • When moving point-to-point
      – On non-lattice booms
      – On non-horizontal lattice booms
    • At work station on any part of the equipment
      – Except:
        » At or near draw-works (when equipment is running)
        » In the cab
        » On the deck
  – More than 15’:
    • When moving point-to-point
      – On horizontal lattice booms
Fall Protection

• Anchor points
  – To any apparently substantial part
  – PFAS
    • Unless visual by competent person concludes won’t support 5,000#/person or safety factor of 2
  – Positioning devices
    • Unless visual by competent person concludes won’t support 3,000# or twice the impact load
  – Attachable anchor devices
    • Must comply with 502(d)(15) and (e)(2)
Fall Protection

• Anchoring to the load line
  – PFAS may be anchored to
    • Hook
    • Other part of the load line
  – ONLY IF
    • Qualified person determines equipment set-up & rated capacity exceeds 5,000#/employee or SF=2
    • Operator is on-site & informed equipment used for anchor point
    • No load is suspended while used as anchor point
Keeping Clear of Load

• No one in fall zone unless
  – Hooking/unhooking/guiding
  – Attaching load to structure
  – Operating concrete bucket

• Then only if
  – Rigged by qualified rigger
  – Rigged to prevent displacement
  – Self-closing latches on hooks

• Loads being received
  – Must be rigged by a qualified rigger
Operator Certification/Qualification
Operator Certification/Qualification - 4 Options

- **OPTION 1:** Certification by Accredited Testing Organization
- **OPTION 2:** Employer Qualification Program
- **OPTION 3:** U.S. Military Qualification
- **OPTION 4:** State/Local Government License
Option 1: Certification

Nationally Recognized Accrediting Agency

Accredited Testing Organization

Determines Compliance with Testing and Test Administration Criteria

Develops and Administers the Tests (Written and Practical) to Certify Operators

Different Tests for Different Capacity/Type of Equipment
Option 2: Employer Qualification

Nationally Recognized Accrediting Agency

Certified Auditor

Accredited Testing Organization

Determines Compliance with Testing and Test Administration Criteria

Ensures Employer’s Program Complies With Testing & Test Admin Criteria

Employer Administers Written & Practical Tests

Different Tests for Different Capacity/Type of Equipment
Option 3: U.S. Military Qualification

U.S. Military Issues Operator Qualification
Option 4: State/Local Gov License

State/Local Government Authority that Oversees Licensing Office

Determines License Office Complies with Testing & Test Administration Criteria

State/Local Government License Office

Issues Operator License
## Operator Certification/Qualification (cont’d)

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<tr>
<th></th>
<th>Portable</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cert by Accredited Testing Organization</td>
<td>YES *</td>
<td>5 years</td>
</tr>
<tr>
<td>Employer Qualification Program</td>
<td>NO</td>
<td>5 years</td>
</tr>
<tr>
<td>US Military Qualification</td>
<td>NO *</td>
<td>Set by issuing entity</td>
</tr>
<tr>
<td>State/Local License</td>
<td>NO *</td>
<td>Set by issuing entity, not &gt; 5 years</td>
</tr>
</tbody>
</table>

* Subject to State & Local requirements and whether or not the military/state training meets accredited requirements.
Operator Certification/Qualification (cont’d)

- **OPTION 1:** Accredited Testing Organization
- **OPTION 2:** Employer Qualification Program
- **OPTION 3:** U.S. Military
- **OPTION 4:** State/Local Gov License

**Testing Criteria**

- **Knowledge** (Written Test):
  - Controls/performance characteristics
  - Calculate capacity (with or without calculator)
  - Preventing power line contact
  - Ground support
  - Read and locate info in operating manual
  - Appendix C tech knowledge

- **Practical Test**
### Signal Person Qualifications

<table>
<thead>
<tr>
<th>Qualified How</th>
<th>Documentation</th>
<th>Portable</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Party Qualified Evaluator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Employer Qualified Evaluator</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Signal Person Qualifications (cont’d)

• Qualification Requirements:
  – Know and understand signals
  – Competent in using signals
  – Basic understanding of crane operation
  – Verbal or written test and practical test
Tower Cranes
Tower Cranes (cont’d)

SUPPLEMENTAL REQUIREMENTS
Highlights of Supplemental Tower Crane Requirements

• **Foundations & Structural Supports**
  – Designed by manufacturer or RPE

• **Plumb Tolerance**
  – Comply with manufacturer’s tolerance
  – Verified by qualified person
  – If no manufacturer’s tolerance
    • 1:500 (~1 inch in 40 feet)

• **Wind Speed**
Highlights of *Supplemental* Tower Crane Requirements

- **Pre-Erection Inspection**
- **Post-erection Load Test**
  - Per manufacturer’s instructions
  - If no manufacturer’s instructions
    - Per written load test procedures
    - Developed by RPE familiar with equipment
- **Climbing Procedures**
  - Comply with manufacturer’s prohibitions
  - RPE verification of host structure strength
Highlights of *Supplemental* Tower Crane Requirements

- **Monthly Inspection:**
  - Same as cranes in general
  - *PLUS*
  - Tower mast bolts
  - Upper-most tie-in
  - Braces
  - Floor supports
  - Floor wedges
Highlights of Supplemental
Tower Crane Requirements

• **Annual Inspection:**
  – Same as cranes in general
  
  *PLUS*
  – All turntable & tower bolts
    • Proper condition
    • Proper torque
Resources

- Cranes and Derricks in Construction Final Rule

- Associated Training Service Network

- National Commission for the Certification of Crane Operators
  - [http://www.nccco.org/](http://www.nccco.org/)

- National Association of Heavy Equipment Training Schools
  - [http://www.heavy-equipment-school.com/](http://www.heavy-equipment-school.com/)

- North American Crane Bureau Group
  - [http://www.cranesafe.com/history.htm](http://www.cranesafe.com/history.htm)

- California Crane School

United States Department of Labor
Summary

• New Standard
• Scope
• Ground Conditions
• Assembly/Disassembly
• Power Line Safety
• Inspections
• Safety Devices
• Operational Aides

• Operations
• Signals
• Fall Protection
• Operator Certification/Qualification
• Tower Crane (supplemental requirements)

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