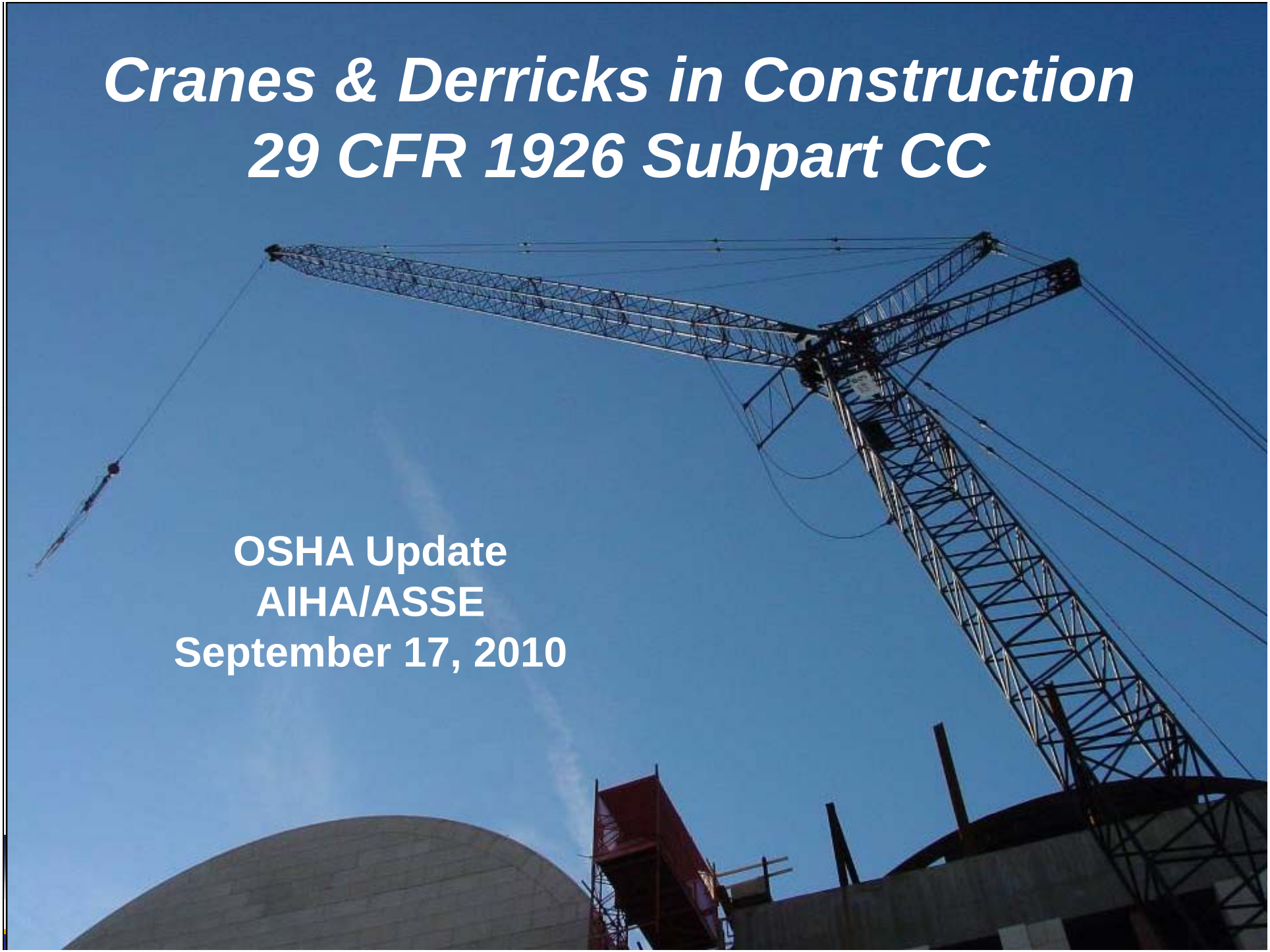
Cranes & Derricks in Construction
29 CFR 1926 Subpart CC



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!

- Scope
- Definitions
- Ground Conditions
- Assembly/Disassembly
- Power Line Safety
- Inspections
- Wire Rope
- Safety Devices
- Operational Aids
- Operation
- Authority To Stop
- Signals
- Fall Protection
- Work Area Control
- Keeping Clear Of The Load
- Free Fall/ Controlled Load Lowering
- Operator Qualification and Certification

- Signal Person Qualifications
- Qualifications of Maintenance and Repair Workers
- Training
- Hoisting Personnel
- Multiple Crane/Derrick Lifts
- Design, Construction and Testing
- Equipment Modification
- Tower Cranes
- Derricks
- Floating Cranes/Derricks & Land Cranes/Derricks on Barges
- Overhead and Gantry Cranes
- Dedicated Pile Drivers
- Sideboom Cranes
- Requirements for Equipment w/ Capacity of 2000 lbs and Less

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)

1. Machinery converted to non-hoisting/lifting
2. Power shovels, excavators, wheel loaders, backhoes, loader backhoes, track loaders (even if using chains, slings or other rigging to lift suspended loads)
3. Auto wreckers, tow trucks when used to clear wrecks/haul vehicles
4. Digger derricks used to auger holes & place poles for electric & telecomm, & moving material onto poles
5. Aerial lifts
6. Telescopic/hydraulic gantries
7. Stacker cranes
8. PITs unless configured with winch/hoist
9. Mechanics truck when hoisting for equipment maintenance/repair
10. Come-a-long or chainfall hoists
11. Dedicated drilling rigs
12. Gin poles used for erecting comm towers
13. Tree trimming & removal work
14. Anchor handling or dredge-related ops with a vessel or barge using an affixed A-frame
15. Roustabouts
16. Helicopter cranes
17. Material delivery

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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

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

      and

      - Has the authority to take prompt corrective measures
    - **Qualified**

      Through

      - Recognized degree, certificate, or professional standing

      or

      - 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

Assembly/Disassembly (cont'd)

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

1926.1408-.1409

Could you get within 20' (up to 350 kV) or 50' (over 350 kV) of a power line?

YES

NO

No Further Action

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**

Table A – Minimum Clearance Distances	
Voltage (nominal, kV, alternating current)	Minimum Clearance Distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1000	45
over 1000	(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)

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: **1926.1410**

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

Type of Inspection:	Who Inspects:
Modified or Repaired/ Adjusted	Qualified
Post-assembly	Qualified
Shift	Competent
Monthly	Competent
Annual	Qualified

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

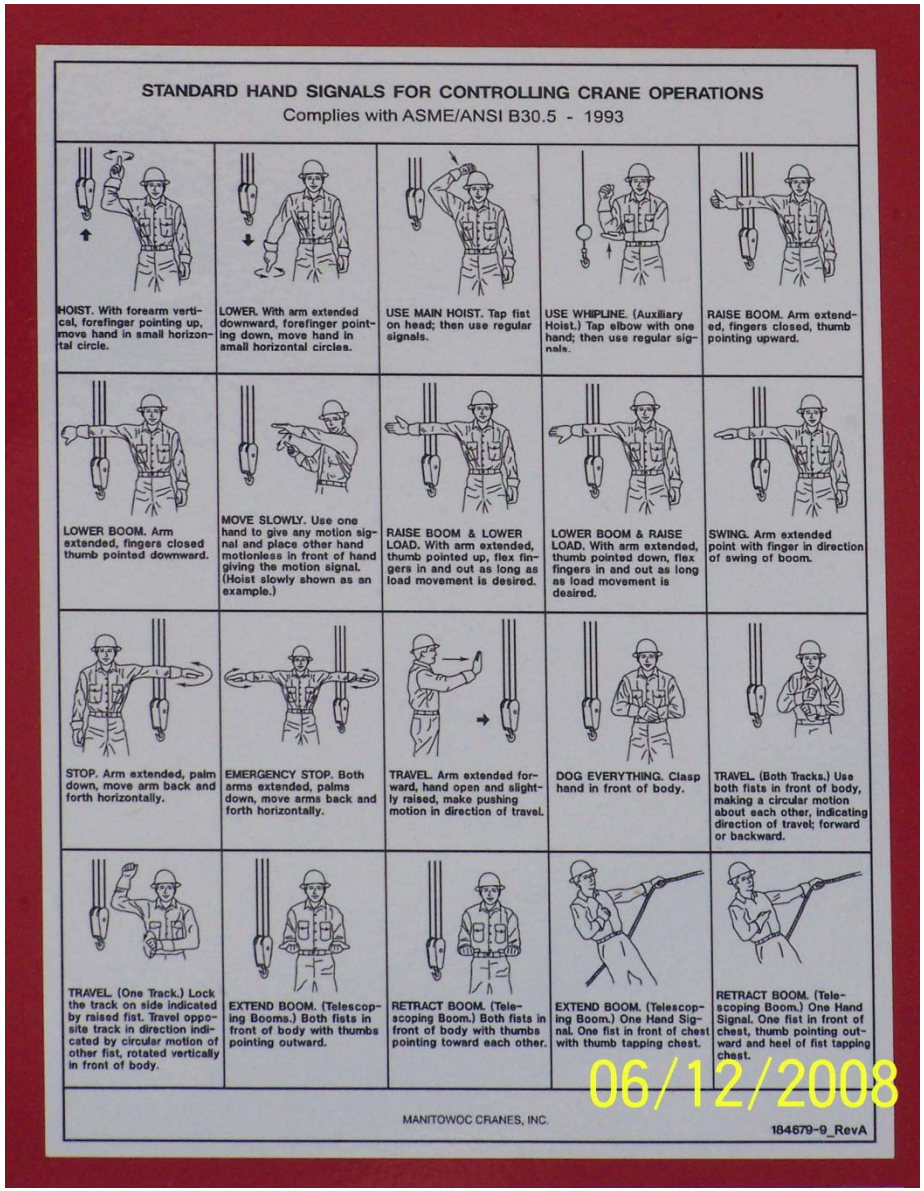
- Comply with manufacturer procedures

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



STANDARD HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS

Complies with ASME/ANSI B30.5 - 1993

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

LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

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

USE WHIPLINE. (Auxiliary Hoist.) Tap elbow with one hand; then use regular signals.

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

LOWER BOOM. Arm extended, fingers closed thumb pointed downward.

MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as an example.)

RAISE BOOM & LOWER LOAD. With arm extended, thumb pointed up, flex fingers in and out as long as load movement is desired.

LOWER BOOM & RAISE LOAD. With arm extended, thumb pointed down, flex fingers in and out as long as load movement is desired.

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

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

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

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

DOG EVERYTHING. Clasp hand in front of body.

TRAVEL. (Both Tracks.) Use both fists in front of body, making a circular motion about each other, indicating direction of travel; forward or backward.

TRAVEL. (One Track.) Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body.

EXTEND BOOM. (Telescoping Booms.) Both fists in front of body with thumbs pointing outward.

RETRACT BOOM. (Telescoping Boom.) Both fists in front of body with thumbs pointing toward each other.

EXTEND BOOM. (Telescoping Boom.) One Hand Signal. One fist in front of chest with thumb tapping chest.

RETRACT BOOM. (Telescoping Boom.) One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

06/12/2008

MANITOWOC CRANES, INC.

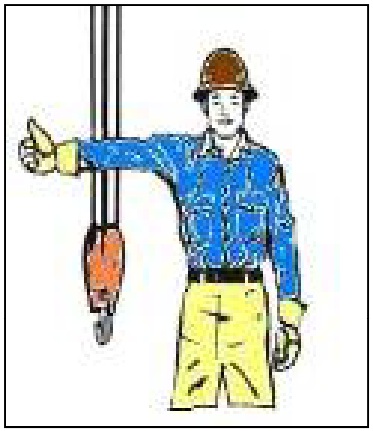
184679-9_RevA

Signals

Signals

- **Signal Person - <u>When Required</u>:**
  - 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

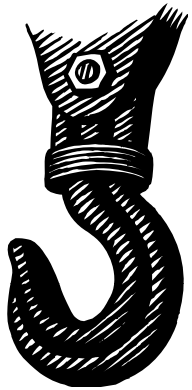
- Not Performing Assembly/Disassembly
  - More than 6':
    - When moving point-to-point
      - On non-lattice booms
      - On non-horizontal lattice booms
    - At work station on any part of the equipment
      - Except:
        - » At or near draw-works (when equipment is running)
        - » In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

1926.1427

Nationally Recognized Accrediting Agency

Determines Compliance with Testing and Test Administration Criteria

Accredited Testing Organization

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

Different Tests for Different Capacity/ Type of Equipment

Option 2: Employer Qualification

1926.1427

Nationally Recognized Accrediting Agency

Determines Compliance with Testing and Test Administration Criteria

Accredited Testing Organization

Certified Auditor

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

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Option 4: State/Local Gov License

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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)

	Portable	Valid
Cert by Accredited Testing Organization	YES *	5 years
Employer Qualification Program	NO	5 years
US Military Qualification	NO *	Set by issuing entity
State/Local License	NO * Valid only in entity's jurisdiction	Set by issuing entity, not > 5 years

* Subject to State & Local requirements and whether or not the military/state training meets accredited requirements.

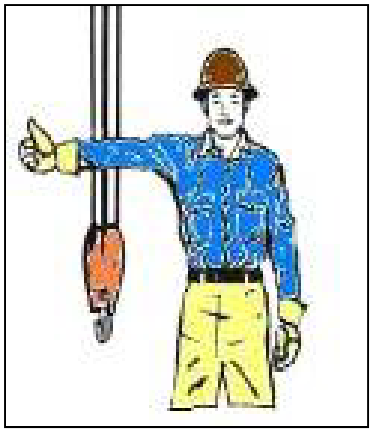
Operator Certification/Qualification (cont'd)

- **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**

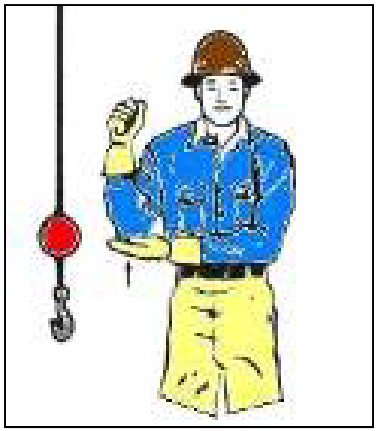
Signal Person Qualifications



Qualified How	Documentation	Portable
3rd Party Qualified Evaluator	Yes	Yes
Employer Qualified Evaluator	Yes	No

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 S*upplemental* 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 S*upplemental* 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 S*upplemental* 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 S*upplemental* 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**
  - http://www.osha.gov/cranes-derricks/index.html
- **Associated Training Service Network**
  - http://www.operator-school.com/
- **National Commission for the Certification of Crane Operators**
  - http://www.nccco.org/
- **National Association of Heavy Equipment Training Schools**
  - http://www.heavy-equipment-school.com/
- **North American Crane Bureau Group**
  - http://www.cranesafe.com/history.htm
- **California Crane School**
  - http://www.californiacraneschool.com/

Summary

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

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