

## **Back to the Basics Cranes**

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### **Introduction**

In recent years, cranes have been thrust into the limelight, front page news because of accidents such as Big Blue, the crane accidents in New York and Miami and other places. The loss of life and large dollar value associated with crane accidents has spurred actions. OSHA, which is charged with the protection of workers and work place safety, has stepped up with the insurance sector, manufacturers of cranes, and the construction industry, as well as the trade organization, to pool all their resources and knowledge for change and improvement to the current standards. This paper will identify and address any issues associated with the use of cranes on site.

OSHA has started the movement for change with a new crane standard soon to be put in place; this standard will have new requirements for crane operations, a set of checks and balances to eliminate crane accidents, and the number and severity of the crane incidents. While the new federal OSHA Crane Standard is not in place yet, states such as Maryland, New York and others have installed their own new crane standards in their state programs. When working in a new location, or state make sure you meet the local requirements for crane operations. Maryland, for example, has requirements for notification to the Department of Labor Office MOSH for cranes performing special lifts, two-crane picks or tower crane jumping, etc. (DLLR, 2009). They also have specific qualification requirements for the crane operator, rigger, and signal man. These people must have knowledge of, training in, and experience in their specific job classification and be documented (DLLR, 2009).

Where can you go for help or specific training for requirements for crane operators, riggers and signal people? The National Safety Council (NSC), AGC, ABC, Construction Safety Council, trade organizations, your insurance provider, manufacturers of cranes, try them all to see who best provides your specific needs. The training varies in price from free to a fee.

These companies or organizations not only provide training but usually training videos or DVDs for free or purchase. The Internet is another source that will provide you with the names of companies that provide crane operator training, rigging and signal person training and hands-on instruction and supplies (videos/DVD's). They will list providers from all across the country. Once on the job, whether you're a construction manager, general contractor or subcontractor, you need to be totally involved in the crane operation because of the inherent risks and variables associated

with cranes. Know why the crane is there, what it is going to lift, and who it belongs to. Is it a rental or do you or the sub-own the crane?

If it's a sub, ask for the crane annual. Do the same for crane rentals; just because they rent cranes doesn't mean they are in compliance. Then keep the annual on file. Remember, even though that the crane has a crane annual, it doesn't mean there are no deficiencies. It just means they will be listed, and you will be put on notice. A third-party annual inspection is preferable if possible.

The crane inspection on site is done daily before the crane is used; this inspection is done by a qualified person who usually is the operator. Once the crane is on site, ready to be use, check it out. I do a visual inspection. When walking up to the crane, I look for level standards within 1% of level (OSHA, 2008). If there is a question, I break out my three-foot level to double check it. If it's a RT hydraulic crane, I look to see if the outriggers are all the way out off of rubber unless working on the rubber chart. Regarding dunnage under the outriggers: Is it placed at 90 degree angle and placed tightly together? I look for swing radius protection or a spotter; both are acceptable. A spotter should only be used in tight areas.

The boom should have an anti-2-block on the load lines (OSHA, 2008). In high-duty cycle operations, such as pile driving and clamming, an anti-2-block may or may not be used. This is due to the bouncing of the cables, which could lift the anti-2-block and shut the operation down. In another case, the anti-2-block could break off and drop to the ground, possibly striking a worker, thus creating an increase risk to the worker. Make sure the crane deck is clear of all equipment: welder, generator, etc. Is access for the crane operator into the operating station available via ladder or steps? Is the crane glass free from distortion or cracks. Is a boom angle indicator present? During your walk around, you are observing the crane for required signage on the housing, such as crane signals or a swing radius warning (OSHA, 2008). Does the crane have a horn to warn workers when a load is over head? Have the operator lower the block and ball and check it out for load weight marking and load rating (OSHA, 2008). Ask the operator if there is an operating manual in the crane and whether the load chart is posted (OSHA, 2008). If the crane is on water, list and trim must be taken into consideration in the load chart (OSHA, 2008). Is the crane equipped with a load moment indicator or computer, and does it work (OSHA, 2008)? At no time should the computer be shut down to make the lift (OSHA, 2008). Does the cab have a 5BC fire extinguisher in it (OSHA, 2008). Are all gears, sprockets, pulleys guarded? Look high at the boom; if the crane is a lattice-boom crane, look for bend lacing or struts. Look at the running cable for damage, such as broken wires, kinking, bird caging, or heat damage (OSHA, 2008). While the standard has many requirements, looking for compliance with what I have mentioned will get you on the right track (OSHA, 2008).

A special crane operation or lift could include: 75% of the crane's capacity, a one-crane pick and walking with the load, a two-crane pick, and a tower crane-jumping operation. I highly recommend writing a job hazard analysis (JHA) and a critical lift plan. This will identify all the players, crane size, capacity, boom length, operator, rigger, signal men, connectors and erectors, if applicable. It will also identify what their jobs are, and the procedure they will follow to complete their individual task. It is imperative that you do not use a crane when any safety feature on the crane does not work or is missing.

#### Additional Things to Look For

Additional things to look for include:

- 1.) A crawler crane must be positively secured to the barge.
- 2.) The load chart must include list and trim.

- 3.) Employees working over water shall be protected by wearing a personal flotation device.

#### Tower crane

- 1.) Jumping tower crane sections must be done to manufacturer's specifications.
- 2.) Tower crane on tracks must be equipped with limit switch and rail buffer or stop.
- 3.) Tower crane test weights should be stored on site.
- 4.) If there is more than one tower crane on site, the operators should have two radios, one for ground communication to a signal man and one for communication between operators of the tower cranes to prevent contact with the other cranes.
- 5.) Tower crane sections with trapdoors to landings must be keeping closed
- 6.) As operator accesses the top, he should visually check crane sections for missing or loose bolts.
- 7.) DO NOT USE A CRANE THAT THE SAFETY FEATURES DO NOT WORK

#### Pile driving

- 1.) Extra attention should be given to this operation because of the high-duty cycle of the crane and components. Check the cable for wear and broken wires and greasing sheaves. Check for missing or loose bolts.
- 2.) Do not stand under the leads.

When you need to refer to specific requirements for cranes and what OSHA will look for, you can access the following references below:

- 29CFR 1926 OSHA COSTRUCTION
- Subpart N Cranes and Derricks  
1926.550 page 305 mancom
- Subpart H Material/Rigging  
29CFR 1926 .251 page 237 mancom
- EM 385 1-1 US CORP of ENGINEERS  
Cranes and Derricks 16 C page 303
- ANSI/ASME B 30

## Appendix: Quick Checklist

Here is a quick checklist; carry it with you to remind you what to look and ask for. This is a quick checklist; it is by no means is it a complete list of everything in the OSHA standards, EM385 or ANSI B 30. This document is in words and items may be added or deleted as needed.

- Print on front and rear of sheet of 8 by 11 paper.
- Fold at center of sheet of paper between columns. →
- Laminate sheet if so desired.
- Fold at center of sheet of paper between columns ←

## Crane Checklist

### Potential Job Site Hazards

- 1.) Electrical: High-voltage overhead lines;  
Underground: High-voltage electric lines
- 2.) Utility pipes: water, gas, fuel, storm sewer, sewage, fiber optics, etc. The weight of the crane and load lifted creates the potential for collapse of pipes and crane collapse.
- 3.) Water: location, potential for flooding, dry river beds, tides, barge work
- 4.) Weather: Visibility concerns, such as wind, snow, rain
- 5.) Wind: Acceptable working limits of crane during high winds
- 6.) Aircraft hazards: airplanes or helicopters:  
Is your location or height of your crane near a hospital of airport flight path?  
This requires FAA notification and special requirements, such as the marking of the crane with a special flag and a continuous burning red light.
- 7.) When operator and signal man cannot see each other, radios must be used.

### Crane on a Barge on Water

- 1.) Crane must be positively secured to the barge.
- 2.) Load chart must include list and trim.
- 3.) Employees working over water shall be protected by wearing a personal flotation device.

### Tower Crane

- 1.) Jumping tower crane sections must be done to manufacturer's specifications.
- 2.) Tower crane on tracks must be equipped with limit switch and rail buffer or stop.
- 3.) Tower crane test weights should be stored on site.
- 4.) If there is more than one tower crane on site, the operators should have two radios, one for ground communication to a signal man, and one for communication between operators of the tower cranes to prevent contact with other cranes.

### Pile Driving

- 1.) Extra attention should be giving to this operation because of the high duty cycle of the crane and components. Check the cable for wear and broken wires or greasing sheaves.

### Rigging

- 1.) **Nylon slings**, marked with load rating, with no tears, cuts, burns, red threads showing; if so take out of service.

- 2.) **Wire rope slings**, three broken wires in a strand, six in a lay, bird caging, crushing, kinking or any other damage, take out of service.

Crane must have in it (OSHA will ask for these):

1. Current crane annual
2. A daily crane log
3. A load chart, the manufacturer's crane manual

(If on water, list and trim must be taken into account.)

Crane must be equipped with:

1. Glass that is free of cracks or distortion.
2. Proper signage on crane that is clearly visible, crane signals, swing hazard warning.
3. All gears, chains, sprockets, pulleys, belts, etc., that are guarded.
4. 5BC fire extinguisher.
5. Exhaust pipe guarded.
6. Boom angle indicator.
7. Controls that are marked as to their function.
8. Horn.
9. Anti two-block device.
10. Platform with anti-skid surface, ladder access or steps where needed.
11. Running rope in compliance.
12. Block and ball marked with their weight.
13. Load chart and crane manual/operating guide

**Critical lift plans** can be downloaded from the Internet. They will identify who, what, where, and how the lift will be accomplished.

#### Crane Checklist: The Crane Set-Up

1. Placement of crane, with the ground: Has it been graded within 1% of level?
2. Has it been compacted, will it support the crane and load?
3. Do I have cribbing or deck mats available to spread the load of the crane and lift?
4. Crane is placed, cribbing is placed under outriggers at 90° angle tight together to spread the load.  
If crawler crane is used, deck mats may or may not be used depending on ground condition.
5. Crane is leveled within 1% of grade for crawler crane. If an RT or mobile truck crane is used, it shall be leveled using the crane's level device. Also, a three-foot carpenter's level on the crane frame can be used to double check it for level.
6. Once leveled, the operator shall see that the swing radius is placed or a spotter is used during the lift and swing.
7. The operator pre inspects crane and its functions.
8. The operator knows where the load will be placed, the distance from the crane to placement, and the total weight of lift. This is calculated by the adding the weight of the block or ball, the rigging used, the cable from block to sheaves, and the object lifted. Then he checks his load charts.
9. Those qualified to signal will do so using the proper signals.
10. The rigger is qualified, has inspected the rigging, and rigged the load correctly or the operator does not lift the load.

**Critical lift plans** should be used for all special lifts, critical lifts within 75% of crane's capacity, or tandem lifts two cranes or more.