

STANDARD PRACTICE INSTRUCTION**DATE IMPLEMENTED:** 4 April 2019**SUBJECT:** Crane Safety

REGULATORY STANDARDS: OSHA - 29 CFR 1910.179 - Overhead and Gantry Cranes
OSHA - 29 CFR 1926.1400 - Cranes and Derricks
OSHA - 29 CFR 1903.1 (The General Duty Clause)
CMAA - Spec. No. 70 and 74 Crane Operator's Manual
ANSI - ANSI/ASME
B-30 series Cranes, Derricks, Hoists,
B- 30.2 Overhead and Gantry Cranes (Top Running Hoist)
B - 30.10 Hooks
B - 30.11 Monorail and Underhung Cranes
B - 30.16 Overhead Hoists (Underhung)
B - 30.17 Overhead & Gantry Cranes (Underhung Hoists)
B- 30.18 Stacker Cranes
B- 30.21 Manually Lever Operated Hoists

BASIS: Serious injury or death can be the result of improper use or use of cranes having defective or poorly maintained components. The Occupational Safety and Health Administration (OSHA) estimates that most of these types of accidents can be prevented if proper safety precautions at job sites are initiated. This poses a serious problem for exposed workers and their employer. The OSHA Crane safety standards establish uniform requirements to ensure that the hazards associated with the use of cranes in U.S. workplaces are evaluated, safety procedures implemented, and that the proper hazard information is transmitted to all affected workers.

GENERAL: Nowland Associates, Inc. will ensure that all cranes used within our facility(s) are evaluated. This standard practice instruction is intended to address comprehensively the issues of evaluating the associated potential hazards, communicating information concerning these hazards, and establishing appropriate procedures, and protective measures for employees.

RESPONSIBILITY: The company Safety Officer is responsible for the administration of this program and has full authority to make necessary decisions to ensure success of the program. All company employees are responsible for safety at all times. This company has expressly authorized the Safety Officer to halt any company operation where there is danger of serious personal injury.

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Nowland Associates, Inc. Crane Safety Program

1. Written Program. Nowland Associates, Inc. will review and evaluate this standard practice instruction on an annual basis, or when changes occur to regulatory standards that prompt revision of this document, or when facility operational changes occur that require a revision of this document. Effective implementation of this program requires support from all levels of management within this company. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of number of workers employed or the number of work shifts. It is designed to establish clear goals and objectives.

2. General Requirements. Nowland Associates, Inc. will establish crane safety operational procedures through the use of this document. This standard practice instruction applies to cranes used in conjunction with other material handling equipment for the movement of material.

3. Initial Training. Training shall be conducted prior to job assignment. This employer shall provide training to ensure that the purpose, function, and proper use of cranes is understood by employees and that the knowledge and skills required for the safe application, and usage is acquired by employees. This standard practice instruction shall be provided to, and read by all employees receiving training. The training shall include, as a minimum the following:

- 3.1 Preoperational inspection requirements of the crane to be used.
- 3.2 Specific operational requirements of the crane to be used.
- 3.3 Principals of crane operations.
- 3.4 Recognition of applicable hazards associated with the work to be completed.
- 3.5 Load determination and balancing requirements.
- 3.6 Procedures for removal of a crane from service.
- 3.7 All other employees whose work operations are or may be in an area where cranes may be utilized, shall be instructed to an awareness level concerning hazards associated with cranes.
- 3.8 Physical and mental requirements of operators. Crane operators will be screened for physical and mental impairments that could result in a improper use. Operators will meet as a minimum, the following requirements before being certified to operate cranes.
 - Be drug and alcohol free during any lifting event.

- Be thoroughly trained in all facets of the required lift.
- Have a mature and safe attitude at all times.
- Have good depth perception (essential for load spotting).
- Have good hearing and vision (corrected or uncorrected).
- Have no history of unsafe acts in the workplace.
- Have the ability to react quickly in an emergency.
- Take no medication that will interfere with the operation.
- Understand the requirements for all phases of the lift.

3.8 Certification. This employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

3.9 Crane Trainers. The following employees or position titles will receive training and as required, serve as crane trainers. Qualified trainers will consist of the following:

Crane Trainers

<u>Title</u>	<u>Member</u>
Crane Trainer	Department Manager
Crane Trainer	Safety Officer
Crane Trainer	First Line Supervisors
Crane Trainer	Qualified Outside Contractors
Crane Trainer	Manufacturers of In-use cranes

4. Refresher Training. This standard practice instruction shall be provided to and read by all employees receiving refresher training. The training content shall be identical to initial training. Refresher training will be conducted on an annual basis or when the following conditions are met, which ever event occurs sooner.

4.1 Retraining shall be provided for all authorized and affected employees whenever (and prior to) there being a change in their job assignments, a change in the type of crane used, equipment being lifted, lifting procedures, or when a known hazard is added to the lifting environment.

4.2 Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever this employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of crane procedures.

4.3 The retraining shall reestablish employee proficiency and introduce new or revised methods and procedures, as necessary.

4.4 **Certification.** This employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

5. Assembly & Disassembly (A/D) Director.

5.1 Assembly/Disassembly must be done by someone who is both a competent person and a qualified person or a competent person who is assisted by one or more qualified persons. Assembly/Disassembly must follow the manufacturer's specifications and instructions.

5.2 The A/D Director must have knowledge of the procedures.

5.3 The A/D Director must review the procedures.

5.4 The A/D Director must ensure the crew members understand the following.

5.4.1 Their tasks.

5.4.2 The hazards associated with their tasks.

5.4.3 The hazardous positions/locations that they need to avoid.

6. Safe Operating Practices for Operators. Whenever any crane is used, the following safe practices (as a minimum) shall be observed:

1. Always check warning devices and signals before use.
2. Always document and maintain inspection records.
3. Always ensure cranes shall not be loaded in excess of their rated capacities.
4. Always ensure the new location support the weight?
5. Always keep employees clear of loads about to be lifted and suspended loads.
6. Always keep suspended loads clear of all obstructions.
7. Always lockout before maintenance or repairing cranes.
8. Always position the hook directly over the load before lifting.
9. Always test brakes by a short lift to ensure control.
10. Before being lifted, loads will be checked for proper balance.
11. Follow the manufacturer's recommendations.
12. Frequently inspect cranes exposed to adverse conditions.
13. Hands must not be placed between the suspension means and the load during lifting.
14. Know where you're going to set the load down!
15. Know your travel path in advance of the lift!
16. Loads will in all cases be properly balanced to prevent slippage.
17. Move loads only after being signaled by the designated, qualified signaler.
18. Never allow riders on loads or hooks.
19. Never allow unauthorized persons to operate cranes.
20. Never attempt to operate a crane or hoist that is suspected to be unsafe.
21. Never carry loads over workers.
22. Never carry loads past workers (they must yield right of way).
23. Never use a cranes that are damaged or defective in any way.
24. Operators must watch the signalers.
25. Shock loading is prohibited.

26. Signalers must keep line-of-sight with the operator.
27. Signalers must watch the load.
28. Test all hoist controls and brakes at the beginning of each shift.
29. Pre-operation hazard assessments should be performed to identify the work zone.
30. All safety devices must be in good working order before operation begins.
31. The crane operator's manual must always be present in the cab.
32. Operators may refuse to lift if there are safety concerns present.
33. Cranes may only be operated by certified/qualified operators.
34. Always mark or barricade the area within the crane's swing radius.

7. Safe Operating Practices for Signalers. Use signalers if the operators view is blocked or obstructed. Whenever any crane is used, the following safe practices (as a minimum) shall be observed:

1. Ensure that only one person is the designated signaler.
2. Ensure the operator acknowledges every signal.
3. Follow the manufacturer's recommendations.
4. Know the new location will support the weight.
5. Maintain line-of-sight with the operator.
6. Operators must watch the signalers.
7. Plan in advance where the load is going!
8. Stop the operation any time comprehension is lost.
9. Ensure the crane is placed on stable ground.

8. Leaving or Parking Hoists or Cranes. Whenever leaving or parking hoists or cranes, the following safe practices (as a minimum) shall be observed:

1. Follow the manufacturer's recommendations.
2. Make a visual check for any dangerous condition.
3. Place all controls in the "off" position.
4. Place main power switch in the "off" position.
5. Raise all hooks to - but not through - limit switches.
6. Report all cranes that are not in operation immediately.
7. Report any defects immediately.
8. Tag out defective equipment immediately.

9. Handling Sling Loads. The following general safe practices (as a minimum) shall be observed when handling slung loads:

1. Always keep hands and fingers clear of un-tensioned loads.
2. Always keep suspended loads clear of all obstructions.
3. Always keep suspended loads clear of employees.
4. Always pad or protect slings from sharp edges of the load.
5. Always think before you affect a load.
6. Determine the history of the care and usage of the sling.

7. Determine the number of sling legs (if used) and load requirements.
8. Ensure you know rated capacity of the sling.
9. Ensure you know the angle the sling makes with the horizontal line.
10. Ensure you know the size, weight, and center of gravity of the load.
11. Follow the manufacturer's recommendations.
12. Never load in excess of the rated capacity.
13. Never pull a sling from a suspended load under tension.
14. Never shorten with knots, bolts or other makeshift devices.
15. Never use a sling that is damaged in any way.

10. Estimating the Weight of Loads. Lifting will not be conducted until load weights have been determined. When estimating load weights operators will stay within 50% of the cranes rated capacity when estimating loads (or manufacturer recommendation). Never attempt a load lift based solely on a guess! The following methods may be used to estimate the weight of loads.

1. Check equipment nomenclature plates.
2. Check shipping papers.
3. Consult with the equipment manufacturer.
4. Estimate weight using weights of similar loads.
5. Use a dynamometer.
6. Use industry standard tables or charts.

11. Powerline Safety. If any part of the equipment, load line or load (including rigging and lifting accessories), being operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line. The work zone must be identified by either: a) Demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the equipment past those boundaries, or b) Defining the work zone as the area 360 degrees around the equipment, up to the equipment's maximum working radius. Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line. If so, one of the following options must be performed:

Option (1) – Deenergize and ground. Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded.

Option (2) – 20-foot clearance. Ensure that no part of the equipment, load line, or load gets closer than 20 feet to the power line.

Option (3) – Table A clearance. Determine the line's voltage and the minimum approach distance permitted under Table A. (below)

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 1,000	45
Over 1,000	(as est. by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

12. Personal Protective Equipment. Supervisor will ensure that a Job Hazard Analysis is conducted for specific lifting operations. Operators will use the required PPE in the conduct of lifting operations. Protective clothing and equipment considerations:

1. Ensure PPE is appropriate for the particular hazard(s).
2. Ensure PPE is kept clean, fully functional, and sanitary.
3. Maintained all PPE in good condition..
4. Properly store PPE when not in use.

13. Crane Inspections. Where not other wise delineated, crane inspections will be conducted in accordance with this section.

13.1 Crane Inspectors. The following employees or position titles will receive training and as required, serve as crane inspectors. Company qualified inspectors will consist of the following:

Crane Inspectors

<u>Title</u>	<u>Member</u>
Crane Inspector	Department Manager
Crane Inspector	Safety Officer
Crane Inspector	First Line Supervisors

13.2 Inspection intervals.

13.2.1 Daily Inspections. Cranes will be inspected each day before being used, the crane will be inspected in accordance with OSHA, Consensus Standards, and Manufacturer recommendations.

13.2.2 Periodic Inspections. Supervisors will determine and schedule additional inspections periodically during crane use, where service conditions warrant. A thorough periodic inspection shall be made on a regular basis, to be determined on the basis of, frequency of crane use; severity of service conditions; nature of lifts being made; experience gained on the service life of cranes used in similar circumstances, and OSHA, Consensus Standards, and Manufacturer recommendations.

13.2.3 Scheduled Inspections. The qualified inspector will coordinate inspection dates and times with all assigned crane inspectors. The visual inspections will be conducted on a daily basis. Comprehensive inspections shall in no event be at intervals greater than once every 12 months.

13.3 Inspection documentation. Crane inspections will be documented as having been inspected. Scheduled inspections will be documented as having been conducted.

1. Identify items that were inspected.
2. Show the status of the inspected items.
3. Provide the signature of the inspector.
4. Show the date.
5. File it and maintain it!
6. Review the manufacturers specific inspection requirements!

13.4 Inspection documentation storage. Inspection records and certifications shall be maintained for 5 years.

13.5 Damaged/unserviceable Cranes. Cranes found to be damaged or unserviceable will be immediately removed from service.

14. Daily Checks. The following items (as a minimum) shall be checked prior to use of any crane:

1. Check for air or hydraulic fluid leakage.
2. Check for load capacity stenciling on both sides of unit.
3. Check for twisted, broken or kinked cables or chains.
4. Check the operation of the crane; controls & movement.
5. Inspect for deformed, cracked, or stretched hooks.
6. Inspect for serviceable safety latches.
7. Observe correct drum spooling as the hook is raised.
8. Operate empty hook till it actuates the upper limit switch.
9. Operate hoist and trolley brakes, ensure no excessive coasting.
10. Visually inspect all units for integrity, leaks etc.
11. Review the manufacturers specific requirements!

15. Monthly Checks. A competent person shall check the following items (as a minimum) monthly:

1. Follow any additional recommendations of the manufacturer.
2. Inspect for twisted, broken or kinked cables or chains.
3. Inspect hooks for cracks, missing or broken parts.
4. Measure hooks for deformation or stretching.
5. Measure lifting chains for excessive stretch, twisting etc.
6. Review the manufacturers specific inspection requirements!
7. Visually inspect all critical items.
8. Review the manufacturers specific requirements!

16. Periodic Checks. Review the manufacturers specific inspection requirements! The following items (as a minimum) shall be checked at periodic inspections (1 to 12 month intervals):

1. Interval dependent on the type of activity performed.
2. Interval dependent on the severity of service.
3. Interval dependent on the environmental conditions.
4. As a minimum the inspection should cover:

Chain Or Cable	Reeving	Hook Condition
Electrification	Hoist Drives	Travel Drives
Brakes	Limit Switches	Couplings
Rails	Balance	Controls
Warning Devices	End Stops	Signage

17. Periodic CMAA Inspection Recommendations:

<u>Class</u>	<u>Description</u>	<u>Typical Schedule</u>
A	Standby or infrequent service	Annually
B	Light service - 2-5 lifts hr.	Annually
C	moderate service - 50% capacity, 5-10 lifts hr.	Annually
D	Heavy service - 50% capacity, 10-20 lifts hr.	Semiannually
E	Severe service - near capacity, 20+ lifts hr.	Quarterly
F	Continuous severe service - near capacity and continuous service throughout day	Bi-monthly

Note: Different conditions may suggest different intervals.

18. New, Idle, Altered, Used Cranes: The use status of cranes will drive specific requirements for periodic maintenance and servicing. The status of the crane will be determined based on manufacturer recommendations and consultation with specific regulatory standards. Prior to initial or reintroduction into service cranes will be tested and inspected completely using the criteria applicable to periodic inspections. A report will be generated and kept on file for future reference. The manufacturers specific requirements will be reviewed!

19. Preventive Maintenance: Preventative maintenance procedures will be developed and used for specific cranes. Maintenance procedures will be determined on the basis of, frequency of crane use; severity of service conditions; nature of lifts being made; experience gained on the service life of cranes used in similar circumstances, and OSHA, Consensus Standards, and Manufacturer recommendations. Typical requirements include:

1. Adjusting the brakes.
2. Adjusting the operation of limit switches.
3. Checking and filling the gear cases to the proper levels.

4. Cleaning and lubricating the wire rope (cable) and load chain.
5. Cleaning or replacing pitted or burned electrical contacts.
6. Cleaning or replacing the air and fluid filters.
7. Inspecting the operation of all controls and warning systems.
8. Lubricating the bearings, gears, pinions, linkages, shafts, etc.
9. Replacing any contaminated oils.

20. Preoperational Testing Requirements: Preoperational tests will be conducted prior to use of any crane. Testing requirements will be determined on the basis of, frequency of crane use; severity of service conditions; nature of lifts being made; experience gained on the service life of cranes used in similar circumstances, and OSHA, Consensus Standards, and Manufacturer recommendations. Typical requirements include:

Preoperational Tests - General:

1. Check for obstructions in the travel path of the crane.
2. Check upper and lower limit switches.
3. Ensure all emergency disconnects are known before any test.
4. Ensure that the manufacturers recommendations are followed.
5. If you have a checklist - follow it!
6. If you're not familiar with the cranes' operation get help.
7. Inspect all electrical controls for proper operation.
8. Never unwind the spool completely!
9. Observe for smooth operation of the components.
10. Test all controls to determine proper operation.

Preoperational Tests - Hooks:

1. Replace if deformation or cracks are found.
2. Check for proper function of the safety latch.
3. Inspect for twists from the plane of the unbent hook.
4. Check for proper swivel.
5. Hook repair is generally not recommended.
6. Emergency hook repair must be performed only under competent supervision.
7. After any hook repairs, the hook must be load tested before being returned to normal service.

Preoperational Tests - Rope:

1. Broken or worn outside wires.
2. Corroded or broken wires at end of connections.
3. Corroded, cracked, bent, worn, or improperly applied end connections.
4. Reduction in rope diameter (replace if found).
5. Severe kinking, crushing, cutting or un-stranding.

