

Manual Section 4	Issue Date 02/05/12	Revision Date 01/01/24	Policy Number LLCP-038
	<b>Cranes</b>		

### **Purpose**

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. 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.

### **Scope**

All LLC Companies including, Blanchard Industrial, LLC, GIS Engineering, LLC, Grand Isle Shipyard, Inc., and GWIS, Mack Steel, NuWave, Valvemax, Sun Industries, Discovery Industries, Inc.; hereafter identified as “Company”.

### **General**

The Company 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 Corporate HSE Department is solely responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program.

### **Contents of the Crane Safety Program**

- **Written Program**
- **General Requirements**
- **Initial Training**
- **Refresher Training**
- **Assemble and Crane Use**
- **Safe Operating Practices for Operators**
- **Safe Operating of Cherry Pickers and Truck Cranes**
- **Safe Operating Practices for Signalers**
- **Leaving or Parking Hoists or Cranes**
- **Handling Sling Loads**
- **Estimating the Weight of Loads**
- **Personal Protective Equipment**
- **Crane Inspections**
- **Daily Checks**
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- **Periodic Inspection Recommendations**
- **New, Idle, Altered, Used Cranes**
- **Preventive Maintenance Requirements**
- **Preoperational Testing Requirements**
- **Lockout Tagout Considerations**
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- **Crane Lift Plan**

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### **Written Program**

The Company 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 our Organization. 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.

### **General Requirements**

We have established lifting/mobile equipment safety operational procedures through the use of this document. This standard practice instruction applies to overhead, gantry, crawler locomotive, pedestal and truck cranes used in conjunction with other material handling equipment for the movement of material.

All cranes that are owned or operated by the Company, or for the Company, shall have safety devices installed for the purpose of preventing damage to the crane structure and/or incidental occurrences. These safety devices are including but not limiting to:

- Boom angle indicators
- High-Angle Kick outs
- Boom stops
- Boom kick outs
- Anti-two blocks

Safety devices are required to be on all equipment and must be in proper working order before operations begin. If any of the devices are not in proper working order the equipment must be taken out of service and operations must not resume until the device is working properly again. Examples of safety devices may include: crane level indicator, boom stops, jib stops, foot pedal brake locks, horns, etc.

### **Repairs or Alterations**

All repairs or alterations of Company cranes shall be done by an approved and certified organization. No Company employee is allowed to alter or repair cranes unless trained and certified to provide such services.

All Company cranes which have had repairs or alterations, shall be inspected and recertified by a certified crane inspector prior to being put back into service.

### **Initial Training**

The Company shall provide training to ensure that the purpose, function, and proper use of cranes is understood and that the knowledge and skills required for the safe application and usage is acquired. Only designated personnel shall be allowed to operate such equipment.

This standard practice instruction shall be provided to employees receiving training.

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The training shall include, as a minimum the following:

- Preoperational inspection requirements to be used.
- Specific operational requirements to be used.
- Principals of crane operations.
- Recognition of applicable hazards associated with the work to be completed.
- Load determination and balancing requirements.
- Procedures for removal of crane from service.
- All other employees whose work operations are or may be in an area where lifting equipment may be utilized shall be instructed to an awareness level concerning hazards associated with the lifting equipment.
- Physical and mental requirements of operators. Crane operators will be screened for physical and mental impairments that could result in an 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.

### **Certification**

The Company 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. All certifications shall be performed by the following:

- An Accredited Crane Operator Testing Organization
- Qualification by an audited employer program
- Qualification by the U.S. Military
- Licensing by a governmental entity

### **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 as needed basis or when the following conditions are met, whichever event occurs sooner.

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

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- The retraining shall reestablish employee proficiency and introduce new or revised methods and procedures, as necessary.
- Certification. The Company shall certify that employee training has been accomplished and is being kept up to date at least every four (4) years. The certification shall contain each employee's name and dates of training. All employees must have an up to date physical prior to recertification (4 years as well).

### **Assemble and Crane Use**

- Equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met.
- The manufacturer's procedures and prohibitions must be complied with when assembling and disassembling equipment.
- The assembly/disassembly of equipment must be directed by a competent and qualified person.
- The work zone shall be identified by demarcating boundaries such as flag and range limiting devices, or defining the work zone as 360 degrees around the equipment up to the maximum working radius. The hazard assessment must determine if any part of the equipment could get closer than 20 feet to a power line/source.

### **Safe Operating Practices for Operators**

Whenever any crane is used, the following safe practices (as a minimum) shall be observed:

- All manufacturer procedures applicable to the operational functions of equipment, including its use with attachments, must be complied with and readily available in the cab at all times.
- The operator shall have access to procedures applicable to the operation of the equipment. Procedures include rated capacities (load charts shall be in plain view), recommended operating speeds, special hazard warnings, instructions and operator's manual.
- Whenever there is a safety concern, the operator must have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.
- No crane shall be operated when there is a potential for the equipment to strike or injure an employee or pinch/crush an employee against another object.
- The operator must never leave the controls for any reason while a load is suspended.
- Modified field equipment shall not be used.
- A complete Crane Lift Plan (LLCF-015) must be utilized for lifts greater than 50% of the crane's rated capacity or if other conditions warrant a critical lift. The Plan must be reviewed and updated as necessary anytime operations are stopped due to safety concerns or deviations.
- Always check warning and stopping devices before use.
- The operator must communicate with all parties involved via hand signals, voice, or radio and complete JSEA.
- Always document and maintain inspection records of all equipment including slings.
- Always ensure cranes shall not be loaded in excess of their rated capacities.
- Always ensure the new location support the weight.
- Always keep employees clear of loads about to be lifted and suspended loads.

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- Always keep suspended loads clear of all obstructions.
- Always lockout before maintenance or repairing cranes.
- Always position the hook directly over the load before lifting.
- Always test brakes by a short lift to ensure control.
- Before being lifted, loads will be checked for proper balance.
- Never hoist two or more separately rigged loads in one lift, even though the combined load is within the crane's rated capacity.
- Follow the manufacturer's recommendations.
- Cranes should not be operated in wind speeds in excess of 35 mph.
- Frequently inspect cranes exposed to adverse conditions.
- Hands must not be placed between the suspension means and the load during lifting.
- Know your travel path and going to set the load down.
- Loads will in all cases be properly balanced to prevent slippage.
- Move loads only after being signaled by the designated, qualified signaler.
- Never allow riders on loads or hooks.
- Lifting off of a boat should be stopped if sea condition meet or exceed 12'.
- Crane operations shall be stopped if lightning is in the area.
- Do not climb on or off equipment when it is in motion. Do not jump from any vehicle.
- Use both hands to mount and dismount.
- Never allow unauthorized persons to operate cranes.
- Never attempt to operate a crane or hoist that is suspected to be unsafe.
- Never carry loads over workers.
- Never carry loads past workers (they must yield right of way).
- Never use cranes that are damaged or defective in any way.
- Operators must watch the signalers. When unable to see the load, the operator shall be aided by a signalman. Signalers must keep line-of-sight with the operator.
- **\*\*Note: For all blind lifts made by Company personnel, there shall be a minimum of three people making the lift; Certified Operator, Certified Rigger and a Designated Signal Person. \*\***
- Shock loading is prohibited.
- Signalers must watch the load.
- Two full wraps must be maintained on the drum at all times.
- Test all hoist controls and brakes at the beginning of each shift. Warming up hydraulics is recommended.
- No one except authorized personnel is allowed to remove the guards, etc. for repairs or service.
- Shut down the crane when oiling, fueling, checking water or adjusting moving parts.
- Check hooks and catches on snatch block often. Keep snatch block clean and well lubricated.
- A CO2 or dry chemical fire extinguisher shall be kept in the crane cab or vicinity of the crane.
  - Operating and maintenance personnel must be trained with how to operate and care for the fire extinguishers they may need to use in the course of their work.

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### **Safe Operating Practices for Cherry Pickers and Truck Cranes**

- Only certified, qualified and/or authorized operators designated by management or authorized supervisor are allowed to enter the cab, operate the crane, and or perform rigging.
- No two pieces of equipment will operate entirely the same. The make, model, and controls may be identical, but in no way insures identical responses by each Crane. Always become familiar with each piece of equipment prior to its use.
- Inspect all machinery and rigging equipment daily and/or prior to each use (i.e. controls, fluid levels, deformities, cracks, corrosion, blocks, hooks, excessive wear, slings, shackles) lock and/or tag out defective equipment and notify supervisor and remove from service as needed.
- The operator has the responsibility and authority to stop and refuse to handle any load until safety has been assured.
- Familiarize yourself with controls prior to each use. Levers must remain clearly labeled at all times. Anytime a control fails to respond, STOP all operations until the cause is identified and corrective measures are taken as needed.
- Never exceed the rated capacity of the crane and/or rigging equipment (except during testing purposes).
- Outriggers shall always be used except for lighter loads that are clearly within the equipment's capability. Outriggers shall be fully extended at all times when boom is fully extended or when swinging or lifting from the side.
- When traveling with heavy loads outriggers shall remain extended as low as possible to insure ground clearance. The load shall remain as low as possible with the boom retracted as much as possible.
- Before traveling a crane load, a designated person shall be responsible for determining and controlling safety.
- On truck-mounted cranes, no loads shall be lifted over the front area except as approved by the crane manufacturer.
- Keep hands off suspended loads. Tag lines of sufficient length (min. 10') and size (min. ¼") shall be used on all long loads and/or when conditions warrant to allow personnel to remain clear of pinch points. Never allow tag lines to wrap around body parts. Never tie knots in tag lines.
- Only equipment with designated seating areas can carry riders and riders must remain seated in the designated area at all times.
- Never exceed the speed limit. Always remain courteous and conscience of pedestrians, traffic and road conditions. Adjust speed accordingly.
- The operator should only respond to signals from the appointed signal man, but shall obey a stop signal at any time regardless of who gives it. Operator shall only respond to clearly understood signals.
- Never leave the controls or travel with personnel in a workbasket. All outriggers must be fully extended with personnel in a workbasket.
- Use extreme caution around power lines. A minimum safe distance of 15 feet shall be maintained or power lines should be de-energized.
- When not in use, crane should be parked with brakes engaged and hooks or slings high enough to clear workers below.

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- Anti-Two-Blocking Devices shall be utilized at all times when lifting personnel. Locations or facilities that do not have available cranes equipped with anti two block devices shall insure that the personnel in the work basket and the operator maintain continuous communication by way of radio on a pre-designated channel. Only radios with channel locking devices should be used. Never exceed baskets rated capacity in weight or personnel.

### **Safe Operating Practices for Overhead & Gantry Cranes**

Only certified, qualified and/or authorized operators designated by management or authorized supervisor are allowed operate the crane, and or perform rigging.

- Rated Load Marking
  - The rated load of the crane shall be plainly marked on each side of the crane.
  - Each hoist and each hoist attachment should have the rated load clearly marked.
  - These markings shall be clearly legible from the floor or ground.
  - The load shall never exceed the rated load of the crane or hoist or attachment equipment, except during the load test procedures.
- Inspections
  - Initial Inspection
  - New, reinstalled, altered, repaired, and modified equipment shall be inspected and tested prior to initial use to verify whether the crane or hoist can be expected to perform as intended.
  - The operational inspection shall include the following function tests (with an empty hook), as applicable:
    - Lifting and lowering
    - Trolley travel
    - Bridge travel
    - Hoist-limit devices
    - Travel-limiting devices
    - Locking and indicating devices, if provided
  - Pre-Use (Functional) Inspection
    - Operational controls; hoisting and lowering, trolley travel, bridge travel, limit switches.
    - Operational verification of the upper limit device under no-load conditions. The load shall be inched into the limit or run in at a slow speed.
    - Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems.
    - Ropes, looking for the following removal criteria;
    - Distortion of the rope, such as kinking, crushing, unstranding, bird-caging, main strand displacement, or core protrusion.
    - Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
    - General corrosion
    - Broken or cut strands
    - Apparent heat damage from any heat source
    - Number, distribution, and type of visible broken wires:

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- In running ropes, twelve randomly distributed broken wires in one lay or four broken wires in one strand in one lay.
    - One outer wire broken at the contact point with the core of the rope, which has worked its way out of the rope structure and protrudes or loops from the rope structure.
  - Hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper functions, or stretch beyond manufacturer's recommendations.
  - Hooks and latches, looking for the following removal criteria
    - Excessive throat opening
    - Damages or missing safety latch
    - Wear, deformation, corrosion
- Frequent Inspection
  - a. Normal service – Monthly
  - Heavy service – Weekly to monthly
  - Severe service – Daily to weekly
- The following shall be inspected:
  - Operating controls for proper operation, proper adjustment, and unusual sounds; squeaking, grinding, grating, etc.
  - Verify operation of the upper limit device under no-load conditions. The load shall be inched into the limit or run in at a slow speed.
  - Tanks, valves, pumps, lines, and other parts of air or hydraulic systems for leakage.
  - Hooks and latches, looking for the following removal criteria
    - Missing or illegible hook manufacturer's identification or secondary manufacturer's identification.
    - Missing or illegible rated load identification.
    - Excessive pitting or corrosion.
    - Cracks, nicks, or gouges.
    - Wear – any wear exceeding 10% of the original section dimension of the hook or its load pin.
    - Deformation – any visible apparent bend or twist from the plane of the unbent hook.
  - Throat opening – any distortion causing an increase in the throat opening of 5% of the original opening (not to exceed ¼ inch).
  - Inability to lock – any self-locking hook that does not lock.
  - Inoperative latch – any damage latch or malfunctioning latch that does not close the hook's throat.
  - Damaged, missing, or malfunctioning hook attachment and securing means.
  - Thread wear, damage or corrosion.
  - Evidence of excessive heat exposure or unauthorized welding.
  - Evidence of unauthorized alternations such as drilling, machining, grinding, or other modifications.



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- Hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper functions, or stretch beyond manufacturer's recommendations.
  - Rope for proper spooling onto the drums and sheaves
  - Warning devices for proper operation
  - Ropes
- Periodic (Annual) Inspections
 

A factory-trained employee shall conduct periodic inspections or a contract certified inspection service. Equipment shall be inspected at intervals dependent on the use of the equipment as follows:

  - Normal service – Yearly
  - Heavy service – Yearly
  - Severe service – Quarterly
- The inspection shall include the items listed above and the following items as applicable;
  - Deformed, cracked, corroded, worn or loose members or parts.
  - Loose or missing fasteners; bolts, nuts, pins or rivets.
  - Cracked or worn sheaves and drums
  - Worn, cracked or distorted parts such as pins, bearings, wheels, shafts, gears, rollers, locking and clamping devices, bumpers and stops.
  - Hooks
  - Excessive wear of brake system parts
  - Excessive wear of drive chain sprockets and excessive drive chain stretch.
  - Deterioration of controllers, master switches, contact, limit switches, and push-button stations.
  - Gasoline, diesel, electric or other power plants for proper operation.
  - Motion limit devices.
  - Rope reeving.
  - Function, instruction and safety information signs, labels or plates for legibility and replacement.
  - Rope and end connections.

Ensure the inspection is documented to provide a basis for continuing evaluation and retained on file.

- Inspection of Cranes Not in Regular Use
- A crane that has been idle for a period of 1 month or more, but less than 6 months, shall be inspected before being placed in service following the requirements as outlined in Frequent Inspection.
- A crane that has been idle for 6 months or more, shall be inspected before being placed in service following the requirements as outlined in Periodic Inspection.
- General
  - Equipment shall only be operated by a competent operator or trainee that is under the direct supervision of the competent operator.
  - The operator, when operating the equipment, shall maintain full attention on the task being performed and never leave the load unattended.

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- The operator shall ensure that hand signals used during the lift are understood and followed by all involved. See section on Hand Signals.
- If the crane or hoist has been locked and tagged out, the operator shall not remove the lock or tag, unless the lock or tag has been placed there by the operator.
- Operators shall not pass under a suspended load.
- No personnel shall be allowed to walk or be under a suspended load.
- All employees who handle wire slings and hoist cables shall wear leather gloves to prevent any hand injury.
- Proper guards must be in place for exposed gears, belts, electrical equipment, couplings and fans.
- Suspended loads shall be kept clear of all unnecessary obstructions and personnel.
- Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
- Sudden movement, shock loading and side loading is prohibited.
- A sling shall not be pulled from under a load when the load is resting on the sling.
- Two full wraps must be maintained on the drum at all times.

### **Designated Signal Persons (DSP)**

A Designated Signal Person must be provided for the following situations:

- The point of operation is not in full view of the operator
- The view is obstructed when the equipment is traveling
- The operator or the person handling the load determines it is necessary due to site specific concerns.

### **Safe Operating Practices for Signalers**

Whenever any crane is used, the following safe practices (as a minimum) shall be observed:









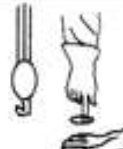






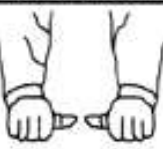




- Ensure that only one person is the designated signaler with the exception of the emergency stop signal.
- Signals to operators must use the hand, voice, audible method. Means of transmitting the signals (direct line of sight, radio, etc) must be suitable and appropriate for the site conditions.
- Ensure the operator acknowledges every signal.
- The ability to transmit signals between the operator and signal person must be maintained. If the ability to transmit signals is interrupted at any time, the operator must safely stop operations requiring signals until communication is reestablished and a proper signal is given and understood.
- Know the new location will support the weight.
- Maintain line-of-sight with the operator, and is easily identifiable and visible.
- Operators must watch the signalers or utilize radios when view is obstructed. The device used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear and reliable.
- Plan in advance where the load is going!
- Stop the operation any time comprehension is lost.

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***Each signal person must:***

- Know and understand the type(s) of signals used;
- Be competent in the application of the type of signals used;
- Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads;
- Demonstrate that he/she meets the qualification requirements through an oral or written test, and through a practical test.
- Determine the history of the care and usage of the sling.
- Always use certified slings.
- Determine the number of sling legs (if used) and load requirements.
- Ensure you know rated capacity of the sling.
- Always check permanent pre-rigged equipment.
- Manila rope is prohibited for lifting application.
- Ensure you know the angle the sling makes with the horizontal line.
- Ensure you know the size, weight, and center of gravity of the load.
- Follow the manufacturer's recommendations.
- Never load in excess of the rated capacity.
- Never pull a sling from a suspended load under tension.
- Never shorten with knots, bolts or other makeshift devices.
- Never use a sling or hook that is damaged in any way.
- Always pad or protect slings from sharp edges of the load.
- Always think before you affect a load.

**Standard Hand Signals**

 Main Hoist	 Auxiliary Hoist	 Hoist Load	 Hoist Load Slowly	 Stop
 Raise Boom	 Raise Boom & Lower Load	 Lower Load	 Lower Load Slowly	 Emergency Stop
 Lower Boom	 Lower Boom & Raise Load	 Swing Boom	 Swing Boom Slowly	 Travel (mobile eqpt)
 Retract Boom 2 hands	 Retract Boom 1 hand	 Extend Boom 2 hands	 Extend Boom 1 hand	 Dog Everything

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### **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:

- Check equipment nomenclature plates.
- Check shipping papers.
- Consult with the equipment manufacturer.
- Estimate weight, using weights of similar loads.
- Use a dynamometer.
- Use industry standard tables or charts. (i.e. rating chart) A substantial and durable rating chart with clearly legible letters and figures shall be provided with each crane and securely fixed to the crane cab in a location easily visible to the operator while seated at his control station.

### **Personal Protective Equipment**

Supervisor will ensure that a JSEA is conducted for specific lifting operations. Operators will use the required PPE in the conduct of lifting operations. Protective clothing and equipment considerations:

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

### **Crane Inspections**

Where not otherwise delineated, all inspections will be conducted in accordance with this section and performed by a competent person. Written documentation shall be maintained for all inspections and load tests when required.

- **Inspection intervals:**
  - Daily/Pre-Use Inspections - Cranes will be inspected each day before being used by a competent person; the crane will be inspected in accordance with OSHA, Consensus Standards, and Manufacturer recommendations. Some inspection items shall include:
    - Control mechanisms
    - Pressurized lines
    - Hooks and latches
    - Wire rope
    - Electrical apparatus
    - Tires (when used)
    - Ground conditions.
  - Monthly Inspections - Equipment must be inspected monthly by a competent person and documented. Documentation must include the following:
    - Crane identifier (serial number, etc.)
    - Items checked,
    - Results of inspection,

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- Name, date and signature of the inspector
        - ***Documentation must be retained for 3 months. (Documented monthly inspection not required if the daily inspection is documented and records are retained for 3 months)***
      - Annual Inspections. Each division manager will coordinate inspection dates and times with all crane inspectors. The inspections will be conducted on a 12 - month basis. Such inspections shall in no event be at intervals greater than once every 12 months.
        - **Crane inspectors:** The Company uses third party crane inspectors; which are certified to inspect all company owned cranes.
- Inspection documentation. All cranes inspections will be documented as having been inspected. Scheduled inspections will be documented as having been conducted.
  - Identify items that were inspected.
  - Show the status of the inspected items.
  - Provide the signature of the inspector.
  - Show the date.
  - File it and maintain it.
  - Review the manufacturers' specific inspection requirements!
- Inspection documentation storage. Inspection records and certifications shall be maintained on site location and also a copy at sent to the Maintenance Coordinator.
- Damaged/unserviceable Cranes. Cranes found to be damaged or unserviceable will be immediately removed from service.
- **Daily Checks** The following items (as a minimum) shall be checked prior to use of any crane:
  - Check for air or hydraulic fluid leakage.
  - Check for load capacity stenciling on both sides of unit.
  - Check for twisted, broken or kinked cables or chains.
  - Check the operation of the crane, controls & movement.
  - Inspect for deformed, cracked, or stretched hooks.
  - Inspect for serviceable safety latches.
  - Observe correct drum spooling as the hook is raised.
  - Operate empty hook till it actuates the upper limit switch.
  - Operate hoist and trolley brakes ensure no excessive coasting.
  - Visually inspect all units for integrity, leaks etc.
  - Review the manufacturer's specific requirements!
- **Monthly Checks.** The following items (as a minimum) shall be checked monthly:
  - Follow any additional recommendations of the manufacturer.
  - Inspect for twisted, broken or kinked cables or chains.
  - Inspect hooks for cracks, missing or broken parts.
  - Measure hooks for deformation or stretching.
  - Measure lifting chains for excessive stretch, twisting etc.
  - Review the manufacturer's specific inspection requirements!
  - Visually inspect all critical items. i.e. brakes, ropes, hooks, etc.
  - Review the manufacturer's specific requirements!

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- **Periodic Checks.** Review the manufacturer’s specific inspection requirements. The following items (as a minimum) shall be checked at periodic inspections (1 to 12 month intervals):
  - Interval dependent on the type of activity performed.
  - Interval dependent on the severity of service.
  - Interval dependent on the environmental conditions.
  - See Manufacture’s Periodic Inspection Form for Minimum Inspection Criteria.

**Periodic Inspection Recommendations:**

Class	Description	Typical Schedule
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.**

**New, Idle, and 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 manufacturer’s specific requirements will be reviewed.

The manufacturer must approve all modifications/additions in writing. A registered professional engineer must be qualified with respect to the equipment involved, and must ensure the original safety factor of the equipment is not reduced.

**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:

- Adjusting the brakes.
- Adjusting the operation of limit switches.
- Checking and filling the gear cases to the proper levels.
- Cleaning and lubricating the wire rope (cable) and load chain.
- Cleaning or replacing pitted or burned electrical contacts.
- Cleaning or replacing the air and fluid filters.
- Inspecting the operation of all controls and warning systems.

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- Lubricating the bearings, gears, pinions, linkages, shafts, etc.
- Replacing any contaminated oils.

### **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, SAE Recommended Practice Test Code J765 (April 1962), and Manufacturer recommendations. Typical requirements include:

#### **Preoperational Tests - General:**

- Check for obstructions in the travel path of the crane.
- Check upper and lower limit switches.
- Check anti-two blocks for function ability.
- Ensure all emergency disconnects are known before any test.
- Ensure that the manufacturers' recommendations are followed.
- If you're not familiar with the cranes' operation get help.
- Inspect all electrical controls for proper operation.
- Never unwind the spool completely.
- Observe for smooth operation of the components.
- Test all controls to determine proper operation.

**Preoperational Tests - Hooks:** A visual inspection will be done daily; and a monthly inspection with a certification record which includes the date of inspection, signature of the person who performed the inspection and the serial number, or other ID, of the hook inspected.

- Replace if deformation or cracks are found more than 15% in excess of normal throat opening.
- Check for proper function of the safety latch.
- Inspect for twists from the plane of the unbent hook replace if more than 10< twist
- Check for proper swivel.
- Replace damaged hook repair prohibited.
- If emergency hook repair must be performed, only under competent supervision.

**Preoperational Tests – Rope (including running rope):** All ropes which has been idle for a period of a month or more due to shut down or storage of a crane on which it is installed shall be given a thorough inspection before it is used. This inspection shall be for all types of deterioration and shall be performed by an appointed or authorized person whose approval shall be required for further use of the rope. A certification record, which includes the date of inspection, and an ID of the rope, which was inspected, shall be prepared and kept readily available.

Typical requirements include:

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

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**Preoperational Test – Hoist chains:** (including end connections) A visual inspection daily plus a monthly inspection shall be made with a certification record which includes the date of the inspection, the signature of the person who performed the inspection and an ID of the chain which was inspected. Typical requirements include:

- Check for excessive wear
- Check for twist.
- Distorted links interfering with proper function.
- Check for stretch beyond manufacturer’s recommendations.

### **Lockout Tagout Considerations**

Lockout Tagout will be conducted when maintenance or servicing is performed on any crane. Lockout requirements will be determined on the basis of, OSHA, Consensus Standards, and Manufacturer recommendations. Typical requirements include:

- Warning or “out of order” signs shall be placed on the crane, also on the floor beneath or on the hook where visible from the floor.
- Review requirements for the individual crane.
- Integrate lock out and maintenance requirements.
- Ensure training in adequate for level of maintenance.
- Ensure written programs are established and reviewed.
- Carefully select lockout devices, ask the manufacturer for recommendations.
- Do not necessarily assume devices are interchangeable between different types of cranes.

### **Safety Precautions "Overhead lines"**

If it is determined that any part of the equipment, load line or load could get closer than 20 feet to a power line then at least one of the following measures must be taken:

1. If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them.
2. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.
3. Ensure no part of the equipment, load line or load gets closer than 20 feet to the power line.
4. Determine the line's voltage and minimum approach distance permitted.