Environmental, Health & Safety

RIGGING EQUIPMENT SAFETY PROGRAM

SINCE 1963

LD DOCSA

ASSOCIATES, INC.
GENERAL CONTRACTORS

Building Sustainable Solutions

Contents

PURPOSE

L.D. Docsa Associates, Inc. (LDD) is dedicated to the protection of our employees from occupational injuries and illnesses. LDD is responsible for providing a safe working environment, and the employees have and must assume the responsibility of working safely. LDD recognizes the potential for serious injury or death while rigging & lifting materials with the help of cranes. To reduce the potential, this program was developed to communicate the proper techniques of rigging.

RIGGING

The term "rigging" refers to both of the following:

- The hardware and equipment used to safely attach a load to a lifting device.
- The art or process of safely attaching a load to a hook by means of adequately rated and properly applied slings and related hardware.

GENERAL RIGGING SAFETY REQUIREMENTS

The following requirements apply:

- Only rigging equipment that is in good condition may be used.
- Rigging equipment shall be inspected to ensure it is safe. Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe (see attached inspection form at end of policy).
- Defective equipment shall not be used and removed from service immediately.

- Rigging equipment shall not be loaded beyond its recommended safe working load. Identification markings, indicating rated capacity for the type(s) of hitch(es) used, the angle upon which it is based, and the number of legs if more than one, shall be permanently affixed to the rigging.
- All employees shall be kept clear of loads about to be lifted and of suspended loads.
- All rigging equipment shall be stored and maintained in accordance with the manufacturer's recommendations.
- Rigging equipment not in use shall be removed from the immediate work area so as not to present a hazard to employees.
- Slings (e.g., wire rope, synthetic web or rope, and chain) and rigging hooks shall:
- Be inspected at least annually by a qualified inspector
- Have a documented inspection history, with records readily available
- Be labeled for identification purposes with a durable tag (synthetic or metal) permanently affixed to the device. Equipment that is not properly labeled shall not be used. However, manufacturer-supplied serial numbers or other individualized markings meet the labeling requirement
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The Responsible Individual for the equipment shall ensure that a designated person determines whether conditions found during inspection constitutes a hazard and whether a more detailed inspection is required. Defective equipment shall be removed from service and destroyed to prevent inadvertent reuse.

All rigging equipment shall be maintained, inspected, tested (or calibrated), inventoried, and stored. The Responsible Individual shall ensure that equipment purchased through commercial channels meets or exceeds the requirements.

Examples of conditions that may require rigging hardware to be removed from service:

- Synthetic slings with Appendix A
    - Abnormal wear
    - Torn stitching
    - Visible red threads from the interior of the sling fabric
    - Broken or cut fibers
    - Discoloration or deterioration
    - Evidence of heat damage
- Wire-rope slings with Appendix B
    - Kinking, crusing, bird-caging or other distortions
    - Evidence of heat damage
    - Cracks, deformation, or worn end attachments
    - Broken wires in excess of regulatory requirements
    - Hooks opened more than 15% at the throat
    - Hooks twisted sideways more than 10° from the plane of the unbent hook
- Shackles, eye bolts, turnbuckles, or other components that are damaged or deformed.
- Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.

The manufacturer's requirements shall also be consulted, and the most conservative requirements shall prevail.

RIGGING A LOAD

Do the following when rigging a load:

- Determine the weight of the load - Do not guess
- Determine the proper size for slings and components
- Make sure that shackle pins and shouldered eye bolts are installed in accordance with the manufacturer's recommendations
- Make sure that ordinary (i.e., shoulderless) eye bolts are threaded in at least 1.5 times the bolt diameter

- Use safety hoist rings (i.e., swivel eyes) as a preferred substitute for eye bolts whenever possible
- Pad sharp edges to protect slings. Machinery foundations or angle-iron edges may not feel sharp to the touch but could cut into rigging when under several tons of load. Wood, tire rubber, or other pliable materials may be suitable for padding.
- Do not use slings, eye bolts, shackles, or hooks that have been cut, welded, or brazed
- Determine the center of gravity, and balance the load before moving it. Keep the attachment points of rigging accessories as far above and as far away from the center of gravity as possible
- Initially lift the load only a few inches to test the rigging and balance
- Tag lines shall be used unless their use creates an unsafe condition
- Protect rigging hardware as required. Items left in the sun may have surface temperatures that exceed the safe limits of synthetic lifting devices

CRANE SAFETY

Cranes must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (in 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 crane manufacturer's procedures and prohibitions must be compiled 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. (see Table A for a chart of high voltage clearance distances)

Power line voltage Phase to phase (kV)	Minimum Safe Clearance (ft)
50 or below	10
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45

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:

- Ensure the power lines have been de-energized and visibly grounded
- Ensure no part of the equipment, load line or load gets closer than 20 feet to the power line
- Determine the line's voltage and minimum approach distance permitted in Table A

A competent, trained person must conduct a visual inspection of equipment prior to each shift. The inspection must consist of observation for apparent deficiencies. Some inspection items shall include control mechanisms, pressurized lines, hooks and latches, wire rope, electrical apparatus, tires (when used), and ground conditions.

Swing Radius Protection

Per OSHA requirements, LDD will install swing radius guards on all crawler and lattice boom cranes or when the rotating superstructure is less than seven (7) feet off the ground or working surface.

Swing radius guards shall barricade access into the pinch points of the crane and rotating superstructure as shown in the following drawings. In addition to these

guards, it is necessary to barricade the areas where the counterweight swings within 2 feet of any object or structure.

Removal of swing radius guards will be permitted for equipment in transit only and must be reinstalled when in its working location. (Spotters will be stationed to prevent personnel from entering pinch point locations.)

The guards create an exclusion zone. This exclusion zone applies to all persons. The only time a person may enter the exclusion zone is when the crane is not moving, swinging or hoisting and the crane operator has acknowledged your presence and has granted access. The operator must stop all swinging and exit the cab.

If anyone is within the exclusion zone when the operator is required to activate the crane, that person shall be warned and move into the clear (outside of the zone) prior to any movement (including hoisting). The operator is responsible to visually verify this either by walking around the machine or physically observing the person in the clear.

The operator, foreman and superintendent shall be responsible for assuring compliance with this policy. All persons around the crane will be informed of this policy prior to assignment.

Hand Signals

The hand signals shown in Appendix C shall be used to communicate with operators unless voice communications equipment (i.e., telephone, radio, or equivalent) is used. Signals shall be discernible or audible at all times. Some special operations may require addition to, or modification of, the basic signals shown in Appendix C. For all such cases, special signals shall be agreed upon and thoroughly understood by both the person giving the signals and the operator.

Critical Lifts

Some lifts may be determined to be a critical lift in which collision, upsetting, or dropping could result in one or more of the following:

- Unacceptable risk of personnel injury or significant adverse health impact (either onsite or offsite).
- Significant release of radioactive or other hazardous material or other undesirable conditions.
- Undetectable damage that would jeopardize future operations or the safety of a facility.
- Damage that would result in unacceptable delay to schedule or other significant program impact such as loss of vital data.
- Any lift exceeding 75% of the rated capacity of the crane.
- Any lift requiring the use of 2 or more cranes.
- Any time the operator deems the lift to be a critical lift.

A lift shall also be designated as critical if the load requires exceptional care in handling because of size, weight, close-tolerance installation, high susceptibility to damage, or other unusual factors.

The authorizing organization shall identify and designate personnel responsible for making lift category. In addition, the organization shall assign a person in charge of the entire lifting operation.

Lifting Personnel

It is not common practice to lift personnel using the load hooks of cranes or hoists. However, if no other solution is possible to reach the work area, a safety bypass permit provided by the customer's requirement, or other verification of the safety plan must be approved by LDD management.

Annual Inspections

Annual preventative maintenance and inspection shall cover items recommended by the equipment manufacturer.

Records

The owner of the crane shall maintain records for any crane or hoist that has been inspected or load tested or that has received a nondestructive evaluation or test. A copy of the inspection record shall be presented to LDD upon request.

The outside vendor contracted by LDD shall load-test the following designed and -fabricated equipment and affix to the equipment a certifying label with the rated capacity:

- Lifting fixtures.
- All components (i.e., scales, and rigging equipment) used for lifting acutely or extremely hazardous materials or for making critical lifts.
- Personnel lifting devices (e.g., platforms and baskets).

RESPONSIBILITIES

The specific responsibilities of individuals and organizations that have key safety roles in LDD crane, hoist, and rigging operations are listed below.

Responsible Individuals for Work shall:

- Verify that workers under their supervision receive the required training and are qualified (including medical examination, as required) and licensed to operate cranes and hoists in their areas
- Verify that training was provided to the prospective crane and hoist operator by a qualified, designated instructor
- Ensure that all riggers are trained and qualified to operate equipment in accordance with applicable industry standards. Records of trained and qualified riggers shall be kept on file at the LDD office.
- Ensure that contract personnel are qualified to operate lifting equipment in accordance with OSHA requirements

Responsible Individuals for Equipment shall:

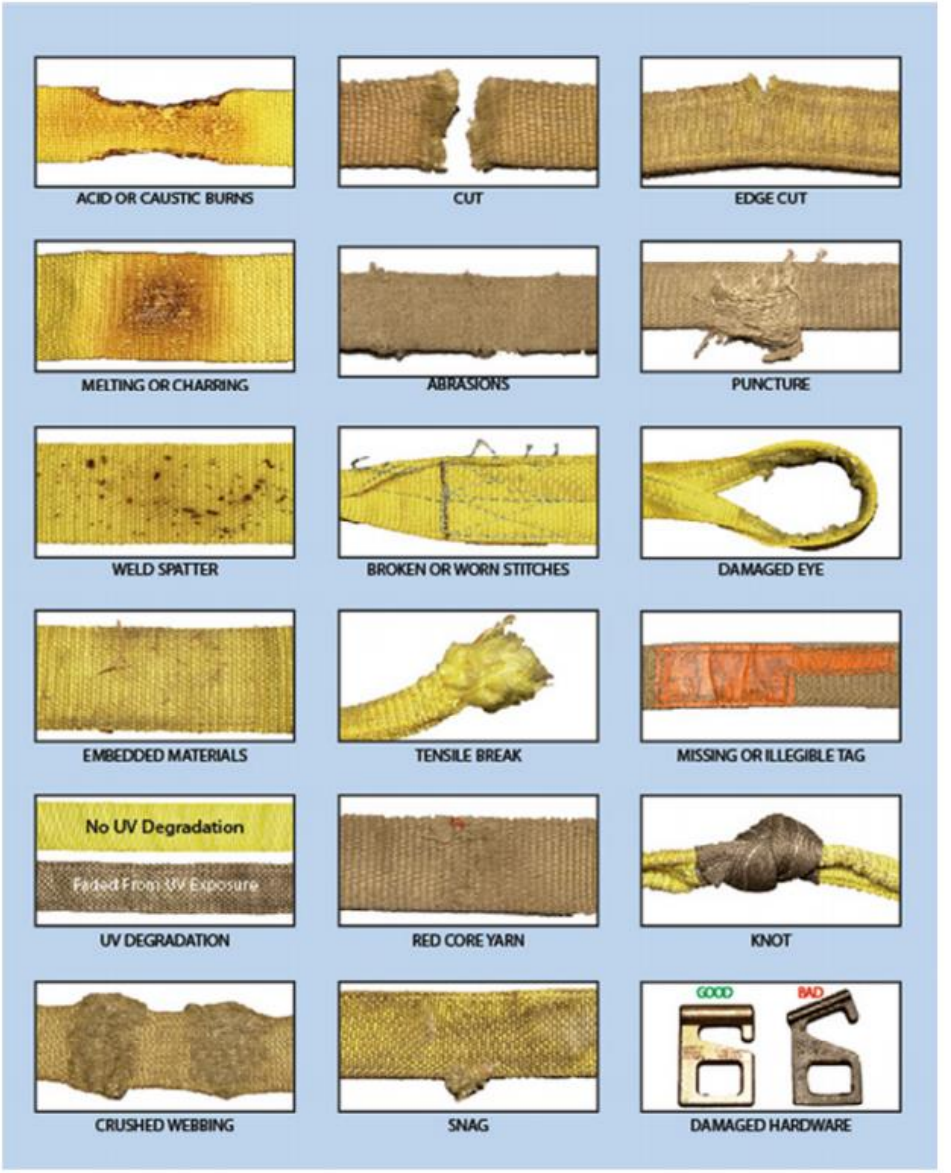
- Ensure that hoisting equipment is inspected
- Maintain copies of all monthly and annual inspections and records of modifications and repairs to the rigging equipment. Records shall be maintained for the lifespan of the equipment.

Crane and Hoist Operators and Riggers shall:

- Operate hoisting equipment according to manufacturer's instructions
- Rig and configure loads according to industry-accepted safe practices
- Conduct a preoperational inspection prior to using the equipment
- Select, inspect, and use rigging equipment as specified in the manufacturer's instructions
- All employees shall be kept clear of loads about to be lifted and of suspended loads.

APPENDIX A

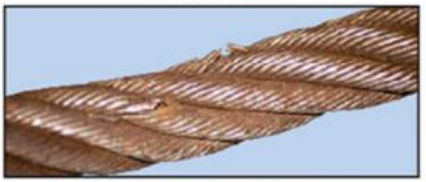
Examples of Damaged Web Slings



APPENDIX B

Examples of Damaged Wire Slings

Broken Wires



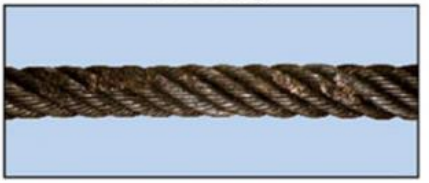
Kinked Wire

Abraded/Worn Wire

Popped Core

Corrosion

Heat Damage

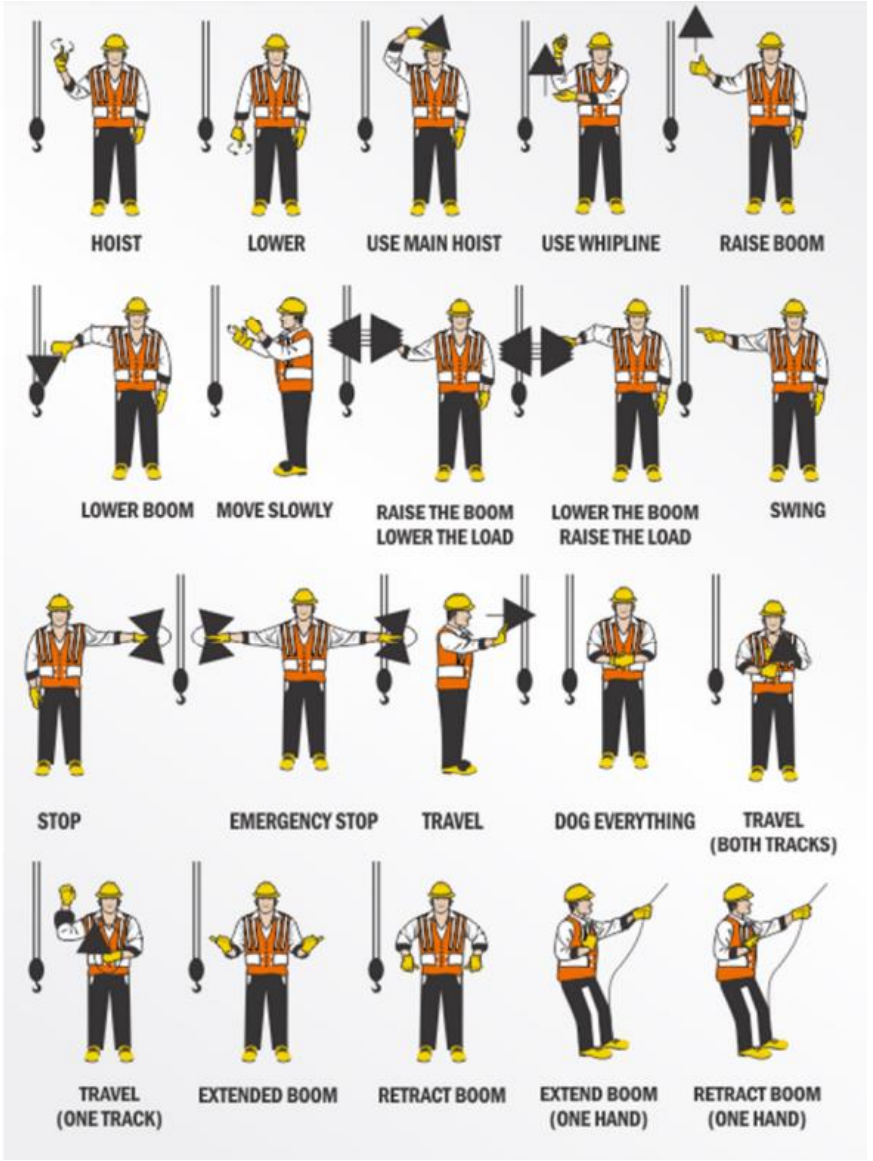


Bird Caging

Damaged Fittings

APPENDIX C

Examples of Hand Signals



APPENDIX D

Inspection, Maintenance, and Test Schedule for LDD-Operated Cranes, Hoists, and Rigging Equipment

The activities specified in this appendix are to be performed as indicated. Deviations from these requirements shall be approved by the appropriate levels of management.

Inspection, Maintenance, and test schedules for LDD Cranes and Hoists

ACTIVITY to be performed	WHEN	BY	THEN complete
Inspection			
Hoists, and rigging Equipment	Monthly	Responsible facility	All LDD and client required forms
Preventative Maintenance			
Lubrication of wire rope and all moving parts	Annually or periodically, as necessary	Maintenance	All LDD and client required forms
Adjustments and repairs	Annually or periodically, as necessary	Maintenance	All LDD and client required forms

APPENDIX E

Field Rigging Material Handling Inspection Checklist

FIELD RIGGING MATERIAL HANDLING SAFETY PROGRAM

This form should be filled out each time you use rigging equipment. The completed form should be turned into your Climate Engineer's Safety Manager weekly. This is required documentation.
Inspection: Before each use, all equipment included but not limited to hooks, shackles, slings, chockers, chains, attachments, fasteners, etc must be inspected for damage or defects by a competent person. Damaged or defective equipment shall be immediately removed from service.

Competent Person Performing Inspection: _____ Date: _____

Jobsite/Location: _____

Task being performed: _____

In certain weather conditions, consider stopping lift/activity.

SHOP CRANES (GANTRY)	Yes	No	N/A
Check for damaged, loose or missing parts	☐	☐	☐
Ensure that hooks, latches, chains show no signs of excessive wear or deformation	☐	☐	☐
Ensure that rated capacity is marked in a prominent location	☐	☐	☐

RIGGING HOOKS	Yes	No	N/A
Check for cracks, nicks and gouges	☐	☐	☐
Check for evidence of heat damage	☐	☐	☐
Check for deformation	☐	☐	☐
Check for excessive wear	☐	☐	☐
Check for damage from chemicals	☐	☐	☐
Is safety latch in place if applicable?	☐	☐	☐
Is Manufacturer's ID and capacity clear?	☐	☐	☐

SHACKLES	Yes	No	N/A
Check for cracks, nicks and gouges	☐	☐	☐
Check for evidence of heat damage	☐	☐	☐
Check for deformation	☐	☐	☐
Check for excessive wear	☐	☐	☐
Check for damage for chemicals	☐	☐	☐
Is Safety Latch in place if applicable?	☐	☐	☐
Is Manufacturer's ID and capacity clear?	☐	☐	☐

EYE BOLTS & SWIVEL HOIST RINGS	Yes	No	N/A
Check for cracks, nicks and gouges	☐	☐	☐
Check for evidence of heat damage	☐	☐	☐
Check for deformation	☐	☐	☐
Check for excessive wear	☐	☐	☐
Check for damage for chemicals	☐	☐	☐
Is Safety Latch in place if applicable?	☐	☐	☐
Is Manufacturer's ID and capacity clear?	☐	☐	☐

WIRE ROPE SLINGS	Yes	No	N/A
Check for wear or scraping of one third of original diameter of the outside diameter	☐	☐	☐
Check for kinking, crushing , bird caging	☐	☐	☐
Check for evidence of heat damage	☐	☐	☐
Check for corrosion of rope or end attachments	☐	☐	☐
Check for end attachments being cracked, deformed or worn	☐	☐	☐
Is capacity clearly labeled?	☐	☐	☐

FIELD RIGGING MATERIAL HANDLING SAFETY PROGRAM

CONTINUED~

ALLOY STEEL CHAIN SLINGS	Yes	No	N/A
Check for cracks, nicks and gouges	☐	☐	☐
Check for evidence of heat damage	☐	☐	☐
Check for deformation	☐	☐	☐
Check for excessive wear	☐	☐	☐
Check for damage for chemicals	☐	☐	☐
Is Safety Latch in place if applicable?	☐	☐	☐
Is Manufacturer's ID and capacity clear?	☐	☐	☐
METAL MESH SLINGS	**Yes**	**No**	**N/A**
Check for broken wires	☐	☐	☐
Check for lack of flexibility due to distortion or rust	☐	☐	☐
Check for Max 15% reduction of original cross section area of metal at any point around an eye handle	☐	☐	☐
Check for Max 25% wire wear from abrasion	☐	☐	☐
Check for Max 15% wire wear from corrosion	☐	☐	☐
Is Manufacturer's ID and capacity clear?	☐	☐	☐
SYNTHETIC WEB OR ROUND SLINGS	**Yes**	**No**	**N/A**
See RED STITCHING - YOU'RE DEAD Immediately throw away.			
Check for acid or caustic burns	☐	☐	☐
Check for melting or charring	☐	☐	☐
Check for snags, punctures, tears	☐	☐	☐
Check for broken or worn stitching	☐	☐	☐
Check for excessive UV Ray damage	☐	☐	☐
Check for Manufacturer ID, load, capacities, and original length.	☐	☐	☐
READINESS FOR LIFTING LOAD	**Yes**	**No**	**N/A**
Has PJHA been completed for this task, attach with form	☐	☐	☐
Have you reviewed daily conditions: weather, proximity to other works & other activities at site: put brief description below:	☐	☐	☐
Have clear picking and landing areas been established along with a clear path with no persons in this path: put brief description below:	☐	☐	☐
Who is involved in this lift and who is the ultimate lead authority for this procedure?			
Have you spoken to the lift/crane operator - how is their awareness, do they approve of the load being lifted, etc.?	☐	☐	☐
Do you have adequate form of communication: radio, hand signals, etc.	☐	☐	☐
Are you aware of each load weight and load center, have you inpsected the materials through the packaging - is load sturdy?	☐	☐	☐
Have you tested stability of this load - rigging it 1' above ground to check for shifts in load before sending?	☐	☐	☐
How many lifts are to be made?	☐	☐	☐