

Lifting Devices and Equipment (LDE)

OVERVIEW



Compliance Requirements

- OSHA (regulatory)
- NASA Standard 8719.9A, Lifting Standard (contract)
- SWI-8834-0001 Rev 6, SSC Lifting Device and Equipment Management Instruction (contract)
- National Consensus Standards [ASME, ANSI/ITSDF, ANSI/SAIA, others] (reg., STD, or SWI)

Types of Lifting Operations

- Noncritical lifts involve routine lifting operations, and are governed by standard industry rules and practices except as supplemented with unique NASA testing, operations, maintenance, inspection, training, and personnel certification requirements.
- An operation shall be classified as a **critical lift** when failure/loss of control presents an elevated risk of serious injury, loss of life, or loss of one-of-a-kind articles, high dollar items, or major facility components whose loss would have serious programmatic or institutional impact; or mobile crane/derrick lifts in which the load exceeds 75 percent of rated capacity. Hoisting of personnel with a mobile crane or derrick is a critical lift activity. Critical lifts require a written lift plan.
- **Engineered lifts** are similar to critical lifts in that there is an elevated risk to facilities, equipment, or personnel. Lifts utilizing multiple lifting devices which could present significant risks are generally classified as engineered lifts. Engineered lifts require a written lift plan.

Note: In no instance shall personnel be located under a suspended load.

Training and Certification

- Contractor personnel that operate LDE shall be trained and/or certified by a recognized certification organization.
- Operators of overhead and gantry cranes, mobile cranes and derricks, powered hoists and winches, hoist-supported personnel lifting devices, mobile aerial platforms, and high lift industrial trucks shall be certified.
 - Certifications shall be renewed periodically (not to exceed a 4-year interval), except for high lift industrial trucks which shall not exceed a 3-year interval.
 - Noncertified operators (applicable to manual hoists and winches used in noncritical lifting operations) shall receive periodic refresher training (not to exceed a 4-year interval).
- All personnel engaged in rigging operations and signal persons shall be trained. Rigging and signal personnel that engage in critical and engineered lifting operations shall be certified.
 - Certifications shall be renewed periodically (not to exceed a 3-year interval).
 - Noncertified riggers and signal persons shall be trained.

General Inspection Requirements

- Lifting Devices
 - Frequent Inspection (Pre-use): A competent person must perform a visual and functional inspection prior to each shift during which the equipment will be used. The inspection must consist of observation for apparent deficiencies. The results of the inspection must be documented with some exceptions.
 - Periodic Inspection: A qualified person must perform a comprehensive inspection of the equipment annually or more frequently as required by OSHA. The inspection must consist of a detailed assessment for deficiencies to include partial disassembly of components as appropriate. The inspection must comply with OSHA regulations and the recommendations of the lifting device manufacturer. The results of the inspection shall be documented.
- Rigging Hardware and Slings
 - Rigging hardware and slings shall be inspected prior to each use by a competent person.

General Inspection Requirements

- Rigging Hardware
 - Visual inspection of common rigging hardware (shackles, rings, swivels, eye bolts, turnbuckles, etc.) shall be performed by a competent user prior to each use. Conditions such as nicks, cracks, gouges, peening, weld splatter, distortion, spreading, twisting, etc. shall be cause for removal from service and disposal.
- Slings (synthetic rope, webbing, round slings, wire rope)
 - Cuts, gouges, badly abraded spots, or other abnormal wear.
 - Seriously worn surface fibers or yarns.
 - Considerable filament or fiber breakage along the line where adjacent strands meet.
 - Powder or particles of broken filaments or fibers inside the rope between the strands (twist or pry rope open for inspection).
 - Discoloration or harshness that may indicate rotting, chemical damage, or excessive exposure to sunlight. Inspect filaments or fibers for weakness or brittleness.
 - Kinks, crushing, or bird caging.
 - Variations in the size or roundness of the strands.
 - Melting or charring of any part of the sling.
 - Severe pitting or corrosion, or cracked, distorted, or broken fittings.
 - Knots in any part of the sling.
 - Other visible damage that causes doubt as to the strength of the sling.
- Hooks shall be inspected during the inspections of the equipment of which they are a part.
 - Removal criteria based on ASME B30.10.
 - Hooks shall be given a surface NDT immediately after all proof load and periodic load tests prior to further use of the hook.
 - Exceptions: Hooks used on noncritical hoists that are not part of an overhead or mobile crane/derrick. Sling and rigging hooks.

Lifting Device Types

- Overhead and Gantry Cranes
- **Mobile Cranes** and Derricks
- **Hoists and Winches**
- **Hoist-Supported Personnel Lifting Devices**
- Jacks
- **Mobile Aerial Platforms**
- **High Lift Industrial Trucks**

Lifting Equipment Types

- Load Positioning and Load Measuring Devices
- Hooks
- Slings and Rigging Hardware

Lifting Device Load Testing Requirements

- **Mobile Cranes**

- A periodic load test shall be performed at least once every four years.
- A periodic load test shall have been performed within one year prior to its use for a critical lift.
- The periodic load test shall consist of the following:
 - With a dummy load equal to 0.95 to 1.00 times the rated capacity at the minimum practical working radius:
 - Hoist and lower the load at various speeds with the boom at the minimum radius.
 - Hold the load for a sufficient duration to verify no drift occurs.
 - Check hoist brake system functionality by placing the load on the hook, hoisting up a few inches, holding the load for a time sufficient for the power-controlled lowering mechanism to bleed off fluid (verifies the functionality of the holding brake), then slowly lowering the load to the ground (verifies proper operation of the power controlled lowering mechanism).
 - With a dummy load not less than 0.50 times the rated capacity at a radius that will safely clear the outriggers (for telescopic boom cranes, use a boom length where all sections are partially extended, if possible):
 - Perform boom hoisting and lowering.
 - Check swing mechanism operation, pausing at each outrigger (when so equipped) for sufficient duration to verify no drift occurs.
 - With no load on the hook:
 - Test all limit switches and E-stop switches.
 - Test locking devices, boom angle indicators, and other safety devices when possible.

Lifting Device Load Testing Requirements

- **Hoist and Winches**
 - A periodic load test shall be performed at least once every four years.
 - A periodic load test shall have been performed within one year prior to its use for a critical lift.
 - The periodic load test shall consist of the following:
 - With a dummy load equal to 1.00 to 1.05 times the hoist/winch's rated capacity or with the attached personnel access platform serving as the dummy load (personnel access platform hoists/winches only), raise and lower the load at various speeds to ensure the hoist is functional under load.
 - Test the holding brakes in one of the following ways:
 - Statically test each brake (under no load) to the design rated torque at the point of brake application.
 - Check each brake for its ability to hold a static dummy load equal to 1.00 to 1.05 times the hoist's/winch's rated capacity.

Lifting Device Load Testing Requirements

- **Hoist-Supported Personnel Lifting Devices**
 - A periodic load test shall be performed at least once every year.
 - The periodic load test shall consist of the following:
 - With a dummy load equal to 1.00 to 1.05 times the device's rated capacity, raise and lower the load at various speeds to ensure the hoist is functional under load.
 - Test the holding brakes in one of the following ways:
 - Statically test each brake (under no load) to the design rated torque at the point of brake application.
 - Check each brake for its ability to hold a static dummy load equal to 1.00 to 1.05 times the hoist's rated capacity.
 - Test E-Stop switches with no load by operating the E-Stop and verifying all motions are precluded.
 - Test all limit switches with no load on the device by operating the device at slow speed into the limit switch and verifying the appropriate motion is precluded.
 - Test safety devices when possible.

Lifting Device Load Testing Requirements

- **Mobile Aerial Platforms**
 - A periodic load test shall be performed at least once every year.
 - The periodic load test shall consist of the following:
 - Hold a dummy load equal to 1.00 to 1.05 times the device's rated capacity (at maximum boom radius, when applicable) for a sufficient duration to verify drift does not exceed that specified by the responsible organization.
 - Test all functions in an unloaded condition, including operation of limit switches and tilt alarm/shutoff.

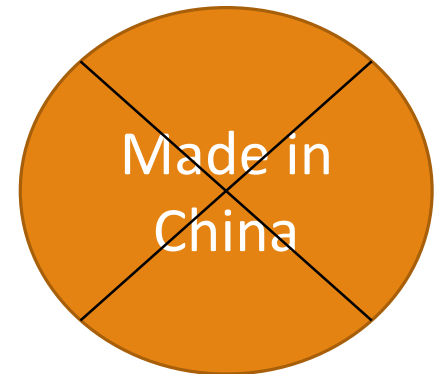
Lifting Device Load Testing Requirements

- **High Lift Industrial Trucks**
 - A periodic load test shall be performed at least once every year prior to its use for a critical lift.
 - The periodic load test shall be performed with a dummy load equal to 1.00 to 1.05 times the industrial truck's rated capacity as follows:
 - Perform all functions, including tilt operation. Ensure the load is secured and will not move during tilting operations.
 - Hold the load for a sufficient duration to verify drift does not exceed that specified by the responsible organization.

Lifting Equip. Load Testing Requirements

■ Slings and Rigging Hardware

- Proof load tests shall be performed with a dummy load of 2.00 to 2.05 times the rated capacity of slings and rigging hardware.
- For structural slings, the proof load test value shall be 1.20 to 1.25 times the rated capacity.
 - Note: Batch or production lot testing of sample slings and rigging hardware does not meet the proof load test requirement.
- The periodic load test for slings and rigging hardware shall be conducted with a dummy load equal to 1.00 to 1.05 times the sling/rigging hardware rated capacity.
 - Slings shall be load tested at least once every four years.
 - Slings shall be load tested within one year prior to use for a critical lift.
 - Rigging hardware shall be load tested within two years prior to use for a critical lift.



Operations Safety

- LDE operations shall comply with OSHA, NASA-STD-8719.9, and SWI-8834-0001. Contractors, agencies, and organizations utilizing LDE are responsible for assuring that employees are trained and informed of the hazards.
- An approved lift plan is required for all critical and engineered lifts.
- Keep-out-zone(s) shall be established prior to the initiation of lifting operations. Keep-out-zones shall be conspicuously defined with an appropriate barrier (rope, tape, cones, etc.). Only personnel associated with the lifting operation are allowed inside the barrier.
- Personnel executing LDE operations or working inside the barrier must use appropriate PPE based on the hazards that are present or likely to be present. Minimum PPE requirements for hoisted load lifting operations are protective footwear, hard hats, and safety glasses. Personnel handling the load or rigging equipment must also wear appropriate protective gloves. Personnel shall not be allowed under a suspended load.
- The effects of wind on the load and lifting device shall be considered in all hoisted load lifting operations. Lifting operations shall be suspended if winds exceed 30 mph, regardless of the lifting device manufacturer rating. Lifting operations are not to be initiated while under a lightning or severe weather warning.
- LDE operators shall consider the potential for tipping with or without use of outriggers, such as wind conditions, ground conditions, action of freely suspended loads, condition and inflation of rubber tires, boom lengths, and operation speeds.

Common Problems

- Lack of proof load / periodic load testing documentation.
- Training and certification records.
- Inspection records.
- Missing and/or illegible manufactures data plates and warning labels.
- Free rigging is Not Allowed. Free rigging is the direct attachment to or placement of rigging equipment (slings, shackles, rings, etc.) onto the tines of a powered industrial truck for a below-the-tines lift. This type of lift does not use an approved lifting attachment.
- Using forklift attachments without proper approval from the forklift manufacturer, and without proper labeling.

Labels – High Lift Industrial Trucks

- High Lift Industrial Trucks: On every removable attachment (excluding fork extensions), the attachment manufacturer shall install a durable, corrosion-resistant nameplate, with the following information legibly and permanently inscribed:
 - model number
 - serial number on hydraulically actuated attachments
 - maximum hydraulic pressure (on hydraulically actuated attachments)
 - weight
 - capacity
 - the following instruction (or equivalent):
 - CAPACITY OF TRUCK AND ATTACHMENT COMBINATION MAY BE LESS THAN CAPACITY SHOWN ON ATTACHMENT. CONSULT TRUCK NAMEPLATE.

Identification – Slings and Rigging Hardware

- Slings and rigging hardware (see exception for noncritical rigging hardware) shall be tagged to clearly identify the manufacturer, the rated capacity, and the test certification date. For multiple part hardware that can be separated (i.e. shackles with pins), the subordinate part (pin) shall be identified to the primary part (bow).
- Noncritical rigging hardware (shackles, rings, swivels, eye bolts, turnbuckles, etc.) shall be permanently marked to identify the manufacturer by name or trademark, the size, and/or the rated or working load limit. Other identification such as material grade, torque value, etc. shall comply with NCS.

Points of Contact

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Questions

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