29CFR 1910.180 Cranes, **29CFR 1926.550** Construction Cranes, **29CFR 1926.21**- Implementing Safety Training and Education

Crane & Hoist Safety

Preparation

1. Read Applicable Background information and related Company Policy Chapter.
2. Make _____ Copies of this Lesson Plan for Personnel
3. Make Transparency, procure transparency pens, etc.
4. Coffee, tea, snacks

Other:

Material

1. Pictures of Cranes and Hoists
2. Pictures of Hoist Hand Signals

Objective

By the end of this session, personnel shall be able to describe:

1. Operator Responsibilities
2. General Safety Rules
3. Operation Rules
4. Rigging Safety Requirements
5. Display and Understand Hand Signals
6. Conduct a Crane and Hoist Safety Checklist

Background

Many types of cranes, hoists, and rigging devices are used at the Company for lifting and moving materials. It is the Company's policy is to maintain a safe workplace for its employees; therefore, it cannot be overemphasized that only qualified and licensed individuals shall operate these devices.

The safety rules and guidance in this chapter apply to all operations at the Company that involve the use of cranes and hoists installed in or attached to buildings and to all Company employees, supplemental labor, and subcontractor personnel who use such devices.

Notes

Lesson

Crane and Hoist Operator Responsibilities

Crane and Hoist Operators are responsible for:

- Operating hoisting equipment safely.
- Conducting functional tests prior to using the equipment.
- Selecting and using rigging equipment appropriately.
- Having a valid operator's license on their person while operating cranes or hoists.
- Participating in the medical certification program, as required.
- Equipment will not be operated within 10 feet of energized electrical transmission lines or distribution lines.
- Ensuring that a fire extinguisher, rated at least 5BC, shall be located in the cab of the crane

General Safety Rules

Operators shall comply with the following rules while operating the cranes and hoists:

- Do not engage in any practice that will divert your attention while operating the crane.
- Respond to signals only from the person who is directing the lift, or any appointed signal person. Obey a stop signal at all times, no matter who gives it.
- Do not move a load over people. People shall not be placed in jeopardy by being under a suspended load. Also, do not work under a suspended load unless the load is supported by blocks, jacks, or a solid footing that will safely support the entire weight. Have a crane or hoist operator remain at the controls or lock open and tag the main electrical disconnect switch.
- Ensure that the rated load capacity of a crane's bridge, individual hoist, or any sling or fitting is not exceeded. Know the weight of the object being lifted or use a dynamometer or load cell to determine the weight.
- Check that all controls are in the OFF position before closing the main-line disconnect switch.
- If spring-loaded reels are provided to lift pendants clear off the work area, ease the pendant up into the stop to prevent damaging the wire.

Notes

General Safety Rules

Operators shall comply with the following rules while operating the cranes and hoists: (continued)

- Avoid side pulls. These can cause the hoist rope to slip out of the drum groove, damaging the rope or destabilizing the crane or hoist.
- To prevent shock loading, avoid sudden stops or starts. Shock loading can occur when a suspended load is accelerated or decelerated, and can overload the crane or hoist. When completing an upward or downward motion, ease the load slowly to a stop.

Operation Rules

Pre-operational Test:

At the start of each work shift, operators shall do the following steps before making lifts with any crane or hoist:

1. Test the upper-limit switch. Slowly raise the unloaded hook block until the limit switch trips.
2. Visually inspect the hook, load lines, trolley, and bridge as much as possible from the operator's station; in most instances, this will be the floor of the building.
3. If provided, test the lower-limit switch.
4. Test all direction and speed controls for both bridge and trolley travel.
5. Test all bridge and trolley limit switches, where provided, if operation will bring the equipment in close proximity to the limit switches.
6. Test the pendant emergency stop.
7. Test the hoist brake to verify there is no drift without a load.
8. If provided, test the bridge movement alarm.
9. Lock out and tag for repair any crane or hoist that fails any of the above tests.

Notes

Moving a Load:

- Center the hook over the load to keep the cables from slipping out of the drum grooves and overlapping, and to prevent the load from swinging when it is lifted. Inspect the drum to verify that the cable is in the grooves.
- Use a tag line when loads must traverse long distances or must otherwise be controlled.
  Manila rope may be used for tag lines.
- Plan and check the travel path to avoid personnel and obstructions.
- Lift the load only high enough to clear the tallest obstruction in the travel path.
- Start and stop slowly.
- Land the load when the move is finished. Choose a safe landing.
- Never leave suspended loads unattended. In an emergency where the crane or hoist has become inoperative, if a load must be left suspended, barricade and post signs in the surrounding area, under the load, and on all four sides. Lock open and tag the crane or hoist's main electrical disconnect switch.

Parking a Crane or Hoist:

- Remove all slings and accessories from the hook. Return the rigging device to the designated storage racks.
- Raise the hook at least 2.1 m (7 ft) above the floor.
- Store the pendant away from aisles and work areas, or raise it at least 2.1 m (7 ft) above the floor.
- Place the emergency stop switch (or push button) in the OFF position.

. **Rigging Safety Requirements**

Only select rigging equipment that is in good condition. All rigging equipment shall be inspected annually; defective equipment is to be removed from service and destroyed to prevent inadvertent reuse. The load capacity limits shall be stamped or affixed to all rigging components.

Notes

. Rigging Safety Requirements (continued)

Company policy requires a minimum safety factor of 5 to be maintained for wire rope slings. The following types of slings shall be rejected or destroyed:

- Nylon slings with abnormal wear.
- Torn stitching.
- Broken or cut fibers.
- Discoloration or deterioration.
- Wire-rope slings with kinking, crushing, bird-caging, or other distortions.
- Evidence of heat damage.
- Cracks, deformation, or worn end attachments.
- Six randomly broken wires in a single rope lay.
- Three broken wires in one strand of rope.
- Hooks opened more than 15% at the throat.
- Hooks twisted sideways more than 10 degrees from the plane of the unbent hook.
- Alloy steel chain slings with cracked, bent, or elongated links or components.
- Cracked hooks.
- Shackles, eye bolts, turnbuckles, or other components that are damaged or deformed.

Do the following when rigging a load:

- Determine the weight of the load. Do not guess.
- Determine the proper size for slings and components.
- Do not use manila rope for rigging.
- Make sure that shackle pins and shouldered eye bolts are installed in accordance with the manufacturer's recommendations.
- Make sure that ordinary (shoulder-less) eye bolts are threaded in at least 1.5 times the bolt diameter.
- Use safety hoist rings (swivel eyes) as a preferred substitute for eye bolts wherever possible.
- Pad sharp edges to protect slings. Remember that 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.

Notes

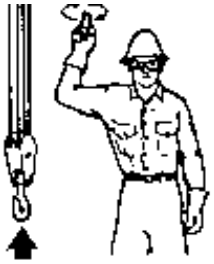
Do the following when rigging a load: (continued)

- Do not use slings, eye bolts, shackles, or hooks that have been cut, welded, or brazed.
- Install wire-rope clips with the base only on the live end and the U-bolt only on the dead end. Follow the manufacturer's recommendations for the spacing for each specific wire size.
- Determine the center of gravity and balance the load before moving it.
- Initially lift the load only a few inches to test the rigging and balance.

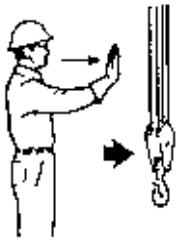
Notes

Hand Signals

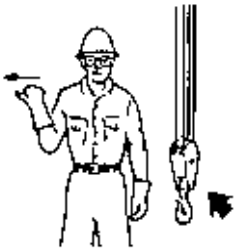
Signals to the operator shall be in accordance with the standard hand signals unless voice communications equipment (telephone, radio, or equivalent) is used. Signals shall be discernible or audible at all times. Some special operations may require addition to or modification of the basic signals. For all such cases, these special signals shall be agreed upon and thoroughly understood by both the person giving the signals and the operator, and shall not be in conflict with the standard signals.



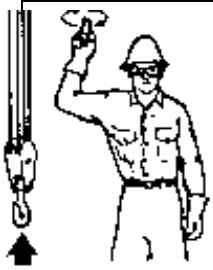
HOIST. With forearm vertical, and forefinger pointing up, move hand in small horizontal circle.



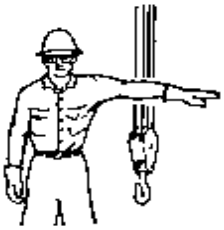
BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



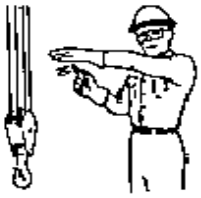
TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.



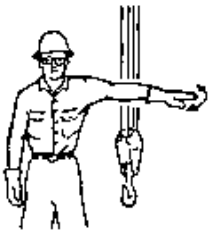
HOIST. With forearm vertical, and forefinger pointing up, move hand in small horizontal circle.



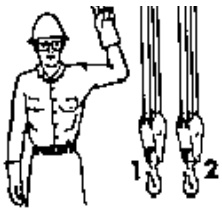
STOP. Arm extended, palm down, hold position rigidly.



MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (*Hoist slowly* shown as example)



EMERGENCY STOP. Arm extended, palm down, move hand rapidly right and left.



MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.

Conducting a Crane and Hoist Safety Checklist

HOIST AND AUXILLARY EQUIPMENT

- ☐ Is each overhead electric hoist equipped with a limit device to stop the hook travel at its highest and lowest point of safe travel?
- ☐ Will each hoist automatically stop and hold any load up to 125 percent of its rated load if its actuating force is removed?
- ☐ Is the rated load of each hois t legibly marked and visible to the operator?
- ☐ Are stops provided at the safe limits of travel for trolley hoist?
- ☐ Are the controls of hoist plainly marked to indicate the direction of travel or motion?
- ☐ Is each cage-controlled hoist equipped with an effective warning device?
- ☐ Are close-fitting guards or other suitable devices installed on hoist to assure hoist ropes will be maintained in the sheave groves?
- ☐ Are all hoist chains or ropes of sufficient length to handle the full range of movement of the application while still maintaining two full wraps on the drum at all times?
- ☐ Are nip points or contact points between hoist ropes and sheaves which are permanently located within 7 feet (2.1336 meters) of the floor, ground or working platform, guarded?
- ☐ Is it prohibited to use chains or rope slings that are kinked or twisted?
- ☐ Is it prohibited to use the hoist rope or chain wrapped around the load as a substitute, for a sling?
- ☐ Is the operator instructed to avoid carrying loads over people?

Closure

All workers who use any Company crane or hoist shall have an operator's license. The Company issues licenses for authorized employees who have been specifically trained in crane and hoist operations and equipment safety.

What questions do you have?

Notes

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Crane & Hoist Safety-Assessment

Name: _____ Date: _____

1) Check all that apply

Crane and Hoist Operators are responsible for:

- ____ Operating hoisting equipment safely
- ____ Training new employees
- ____ Conducting functional tests prior to using the equipment
- ____ Selecting and using rigging equipment appropriately
- ____ Learning CPR and First Aid
- ____ Putting out small fires
- ____ Having a valid operator's license on their person while operating equipment
- ____ Participating in the medical certification program, as required
- ____ Equipment will not be operated within 10 feet of energized electrical transmission lines or distribution lines
- ____ Ensuring that a fire extinguisher, rated at least 5BC, is in the cab of the crane

Fill in the blanks

Operators shall comply with the following rules while operating the cranes and hoists:

2) Do not engage in any practice that will divert your _____while operating the crane.

3) Respond to signals only from the person who is directing the lift, or any appointed signal person. _____ a stop signal at all times, no matter who gives it.

4) Do not move a load _____ people.

5) Visually _____ the hook, load lines, trolley, and bridge as much as possible from the operator's station;

6) Never leave suspended loads _____. In an emergency if a load must be left suspended, _____ and post signs in the surrounding area, under the load, and on all four sides. Lock open and tag the crane or hoist's main electrical disconnect switch.

7) Company policy requires a minimum safety factor of _____ to be maintained for wire rope slings.

8) Do not use _____ rope for rigging

9) **Check those that apply**

The following types of slings shall be rejected or destroyed:

- ____ Nylon slings with abnormal wear.
- ____ Torn stitching.
- ____ Broken or cut fibers.
- ____ Discoloration or deterioration.
- ____ Wire-rope slings with kinking, crushing, bird-caging, or other distortions.
- ____ Evidence of heat damage.
- ____ Red colored slings
- ____ Cracks, deformation, or worn end attachments.
- ____ Six randomly broken wires in a single rope lay.
- ____ Three broken wires in one strand of rope.
- ____ Hooks opened more than 15% at the throat.
- ____ Hooks twisted sideways more than 10 degrees from the plane of the unbent hook.
- ____ Alloy steel chain slings with cracked, bent, or elongated links or components.
- ____ Cracked hooks.
- ____ Shackles, eye bolts, turnbuckles, or other components that are damaged or deformed.

10) **Check all that apply**

Do the following when rigging a load:

- ____ Determine the weight of the load. Do not guess.
- ____ Determine the proper size for slings and components.
- ____ Do not use manila rope for rigging.
- ____ Make sure that shackle pins and shouldered eye bolts are installed
- ____ Make sure that ordinary (shoulder-less) eye bolts are threaded in at least 1.5 times the bolt diameter.
- ____ Use safety hoist rings (swivel eyes) as a preferred substitute for eye bolts
- ____ Pad sharp edges to protect slings.
- ____ Wood, tire rubber, or other pliable materials are not suitable for padding.
- ____ Do not use slings, eye bolts, shackles, or hooks that have been cut, welded, or brazed.
- ____ Install wire-rope clips with the base only on the live end and the U-bolt only on the dead end
- ____ Determine the center of gravity and balance the load before moving it.
- Initially lift the load only a few inches to test the rigging and balance

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Key-Crane & Hoist Safety-Assessment

1) Check all that apply

Crane and Hoist Operators are responsible for:

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- **____ Conducting functional tests prior to using the equipment**
- **____ Selecting and using rigging equipment appropriately**
- ____ Learning CPR and First Aid
- ____ Putting out small fires
- **____ Having a valid operator's license on their person while operating equipment**
- **____ Participating in the medical certification program, as required**
- **____ Equipment will not be operated within 10 feet of energized electrical transmission lines or distribution lines**
- **____ Ensuring that a fire extinguisher, rated at least 5BC, is in the cab of the crane**

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3) Respond to signals only from the person who is directing the lift, or any appointed signal person. **Obey** a stop signal at all times, no matter who gives it.

4) Do not move a load **over** people.

5) Visually **inspect** the hook, load lines, trolley, and bridge as much as possible from the operator's station;

6) Never leave suspended loads **unattended**. In an emergency if a load must be left suspended, **barricade** and post signs in the surrounding area, under the load, and on all four sides. Lock open and tag the crane or hoist's main electrical disconnect switch.

7) Company policy requires a minimum safety factor of **5** to be maintained for wire rope slings.

8) Do not use **manila** rope for rigging

9) Check those that apply

The following types of slings shall be rejected or destroyed:

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- **____ Evidence of heat damage.**
- ____ Red colored slings
- **____ Cracks, deformation, or worn end attachments.**
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- **____ Install wire-rope clips with the base only on the live end and the U-bolt only on the dead end.**
- **____ Determine the center of gravity and balance the load before moving it.**
- **____ Initially lift the load only a few inches to test the rigging and balance**