



INDIANA UNIVERSITY

OFFICE OF THE EXECUTIVE VICE PRESIDENT
FOR UNIVERSITY ACADEMIC AFFAIRS

University Environmental Health and Safety

Crane, Hoist, and Sling Safety Program

October 24, 2017

1. INTRODUCTION

1.1. Purpose

Indiana University has developed the Crane, Hoist, and Sling Safety Program to protect employees against the hazards associated with crane, hoist, and/or sling use. This program establishes the minimum performance requirements for the safe use of cranes, hoists, and/or slings in accordance with the Occupational Safety and Health Administration (OSHA) Standards contained within [29 CFR 1910.179](#) and [29 CFR 1910.184](#).

1.2. Scope

This program applies to all employees at Indiana University. This program covers the following cranes and hoists: overhead bridge cranes, gantry cranes, semi-gantry cranes, wall cranes, overhead monorail cranes, overhead hoists, and other hoists and cranes having the same fundamental characteristics (See [Appendix B](#)). This program covers the following types of slings: alloy steel chain, synthetic round rope, synthetic fiber rope, wire rope, metal mesh, and synthetic webbing (See [Appendix C](#)). This program does not cover mobile cranes or hoists (i.e. wheel-mounted, rough-terrain, commercial truck-mounted, and boom truck cranes), patient hoists, engine hoists, or winches.

2. AUTHORITY AND RESPONSIBILITY

2.1. University Environmental Health and Safety (UEHS) is responsible for:

- Assisting Departments in implementing the provisions of this program;
- Revising and updating the program as necessary;
- Maintaining a list of departmental Program Coordinators; and
- Validating program implementation.

2.2. Departments involved in tasks covered by the program shall be responsible for:

- Assigning a Program Coordinator responsible for program implementation and oversight within the affected Department;
- Informing EHS regarding the creation or assignment of a Program Coordinator; and
- Providing training to employees that are designated as a hoist or crane operator, signal person or rigging person.

2.3. Program Coordinators shall be responsible for:

- Coordinating overall implementation of this program within their department;
- Ensuring that employees receive training consistent with their assigned tasks in accordance with this program;
- Witnessing and approving practical examinations for designated crane operators;
- Maintaining records as specified in [Section 4.2](#);
- Notifying EHS prior to the installation of new cranes and hoists;
- Ensuring that all necessary inspections (See [Appendix D](#)), testing, and maintenance are performed in accordance with this program and the manufacturer's recommendations; and
- Taking the appropriate corrective action when an employee or supervisor reports hazards or unsafe conditions.

2.4. Employees shall responsible for:

- Complying with all aspects of this program;
- Following all applicable safe work practices;
- Attending and completing training required by the department; and
- Notifying the supervisor of any unsafe conditions.

3. PROGRAM ELEMENTS

3.1. Cranes and Hoists

3.1.1. Design and Installation

All cranes installed after August 31, 1971 must meet the general design and installation requirements outlined by ASME B30.2-1. All cranes installed prior to August 31, 1971 must be modified to incorporate all safety-related design features specified within ASME B30.2-1. All cranes and hoists shall be installed according the manufacturer's specifications. A minimum clearance of 3 inches overhead and 2 inches laterally shall be provided during installation and existing structures. Cranes and hoists may be modified or re-rated at any time as long as the modifications and associated structure is analyzed and approved by a qualified person or crane manufacturer. The load capacity of the crane and/or hoist and the associated structure shall be plainly marked and visible from the floor in a conspicuous location.

3.1.2. Inspections

3.1.2.1. Initial Inspection

New, reinstalled, altered, repaired, modified, or overloaded cranes and hoists shall be inspected by a qualified person prior to initial use in accordance to [Section 3.1.2.3](#). Wire ropes and alloy chains, as components of a hoist, shall be inspected, as applicable, in accordance to [Appendix I](#). Inspection of altered, repaired, modified, or overloaded cranes may be limited to the provisions affected by the alteration, repair, or modification, as determined by a qualified person.

3.1.2.2. Frequent Inspection

A frequent inspection shall be conducted before the crane or hoist is put into service each day. The frequent inspection also includes observations made during daily crane and hoist operation. Hazards identified during a frequent inspection shall be reported to the Program Coordinator immediately. The frequent inspection checklist ([See Appendix E](#)) outlines the items that shall be checked as part of the frequent inspection process. Wire ropes and alloy chains, as components of a hoist, shall be visually inspected, as applicable in accordance to [Appendix I](#).

3.1.2.3. Periodic Inspection

The periodic inspection is a documented inspection that includes observations of crane and hoist operation. Wire ropes and alloy chains, as components of a crane or hoist, shall be inspected frequently, as applicable, in accordance to [Appendix I](#). The periodic inspection of the crane or hoist shall be performed annually unless the usage of the crane is considered "severe" or the inspection interval for the wire rope or chain is less, as determined by a qualified person. In this case, the periodic inspection shall be performed at the most conservative interval recommended by qualified person(s). The wire rope or chain, as a component of a hoist, shall be periodically inspected and documented monthly in accordance to [Appendix J](#). If a crane or hoist is idle for a period of 1 year or more, a documented periodic inspection shall be performed on the crane before it is placed back in service. If a wire rope or chain, as part of a hoist, is idle for more than 1 month, a documented periodic inspection shall be performed on this specific component in accordance to [Appendix J](#). The Program Coordinator is responsible for overseeing periodic inspections and determining whether disassembly is required for additional inspection. The frequent inspection checklist ([See Appendix E](#)) and the periodic inspection checklist ([See Appendix F](#)) shall be filled out in their

entirety during the crane and hoist periodic inspection, as applicable to the inspected crane or hoist.

3.1.3. Testing

3.1.3.1. Operational Testing

- a. New, reinstalled, altered, repaired, modified, or overloaded cranes and hoists shall be tested by a qualified person prior to use;
- b. Operational testing of altered, repaired, and modified cranes or hoists may be limited to the functions affected by the alteration, repair, or modification, as determined by a qualified person; and
- c. Tests shall include, as applicable, the following functions:
 1. Lifting and lowering;
 2. Trolley travel;
 3. Bridge travel;
 4. Hoist-limit devices;
 5. Travel-limiting devices; and
 6. Locking and indicating devices.

3.1.3.2. Load Testing

- a. New, reinstalled, altered, repaired, modified, or overloaded cranes or hoists should be load tested prior to use, as determined by a qualified person;
- b. Load testing of altered, repaired, and modified cranes or hoists may be limited to the functions affected by the alteration, repair, or modification, as determined by a qualified person;
- c. Load testing is not required after replacement of load chain or rope;
- d. During load testing, the load shall be not less than 100% of the rated load of the crane or hoist(s), whichever governs; or more than 125% of the rated load of the crane or hoist(s), whichever governs; unless otherwise recommended by the manufacturer or a qualified person;
- e. If a load test is conducted, the person conducting the load test shall prepare a written report of the load sustained during the test and the operations performed during the test. Reports shall be maintained as specified in [Section 4.2](#); and
- f. If a load test is conducted, operations shall be performed as outlined below or as modified by a qualified person when applicable:
 1. Hoist the test load a distance to assure that the load is supported by the hoist brake(s);
 2. Transport the test load by means of the trolley for the full length of the bridge;
 3. Transport the test load by means of the bridge for the full length of the runway in one direction with the trolley as close to the extreme right-hand end of the crane as practical, and in the other direction with the trolley as close to the left-hand end of the crane as practical; and
 4. Lower the test load, and stop and hold the test load with the hoist brake(s).

3.1.4. Maintenance

3.1.4.1. General Maintenance

Departments shall follow the manufacturer's recommendations for preventative maintenance and lubrication, and all replacement parts shall be equivalent to the original manufacturer's specifications as determined by a qualified person. Dated maintenance records shall be maintained as specified in [Section 4.2](#).

3.1.4.2. Maintenance Procedures

The following precautions, if applicable, shall be taken before performing maintenance on a crane or hoist:

- a. If a load is attached to the crane or hoist, it shall be landed;
- b. All controllers shall be placed in the off position;
- c. Lockout/tagout of equipment shall be performed in accordance with the [University Control of Hazardous Energy Program](#);

- d. Warning signs and barriers shall be utilized on the floor beneath the crane or hoist where overhead maintenance work creates a hazard;
- e. If the runway remains energized, stops or a signal person(s) shall be provided to prohibit contact with adjacent equipment or persons performing maintenance;
- f. A guard or barrier shall be installed between any adjacent work areas for the length of any established work to prevent contact with persons or equipment; and
- g. After maintenance work is completed and before restoring the crane or hoist to normal operation
 - 1. Guards shall be reinstalled;
 - 2. Safety devices shall be reactivated;
 - 3. Replaced parts and loose material shall be removed; and
 - 4. Maintenance equipment shall be removed.

3.1.4.3. *Adjustments, Repairs, and Replacements*

Any condition identified by inspections that is determined to be a hazard to continued operation, shall be corrected by adjustment, repair, or replacement before continuing the use of the crane or hoist. Replacement of wire ropes and alloy chains, as components of a hoist, shall be determined by the corresponding replacement criteria, as applicable, specified in [Appendix I](#). The Program Coordinator is responsible for ensuring the elimination of these identified hazards through adjustment, repair, and/or replacement before the crane or hoist is placed back into service. All adjustments, repairs, and replacements shall be performed by qualified persons in accordance to the provisions within ASME B30.2.

3.1.5. **Operation**

3.1.5.1. *Operators*

All designated hoist or crane operators shall be trained in accordance with [Section 4.1](#) of this program. Operators shall be required to pass a practical examination, witnessed by the Program Coordinator, to become designated as a qualified operator for a particular crane or hoist. A separate exam shall be conducted for each crane or hoist assembly. The specific content of the practical examination shall be determined by the Department, but at a minimum, the trainee shall be witnessed performing the frequent inspection correctly and the full cycle of a lift safely. The content of the exam may be limited to the specific type of equipment and job duties of the operator. The exam shall be documented on the crane and hoist exam form ([See Appendix G](#)), and shall be maintained by the Program Coordinator.

Cranes and hoists shall only be operated by the following qualified personnel:

- a. Designated persons as specified by the Program Coordinator.
- b. Trainees under the direct supervision of a designated person.
- c. Individuals engaged in adjustments, repairs, and replacements, when it is necessary in the performance of their duties.

3.1.5.2. *Signal Persons*

All designated signal persons shall be trained in accordance with [Section 4.1](#) of this program. All signal persons shall wear appropriate head, foot and hand protection. Standard hand signals should be used by the signal person in accordance to [Appendix H](#), unless voice communication (e.g. telephone, radio, or equivalent) is utilized for lifts. Standard hand signals used by signal persons shall be posted conspicuously. Special operations may require additions to or modifications to standard signals. Special signals shall be agreed upon and understood by the signal person and the operator, and shall not conflict with standard signals. All communications should be discernible or audible to the operator.

3.1.5.3. *Rigging Persons*

All designated rigging persons shall be trained in accordance with [Section 4.1](#) of this program. All rigging persons shall wear appropriate head, foot, and hand protection. All rigging shall be performed in accordance with the provisions within ASME B30.9 and [Section 3.2.6](#) of this program.

3.1.5.4. *Other Persons*

All persons working in proximity to a crane or hoist shall wear appropriate head, foot, and hand protection when an overhead hazard exists.

3.1.5.5. *Operator Conduct & Safe Work Practices*

- a. The operator shall not engage in any practice that will divert attention while actually engaged in operating the crane or hoist.
- b. When physically or otherwise unfit, an operator shall not engage in the operation of the equipment.
- c. The crane or hoist operator shall do the following, as applicable:
 1. Be familiar with standard and special communication signals ([See Appendix H](#)).
 2. Respond to communication signals from signal persons.
 3. Obey a stop signal at all times, no matter who gives it.
- d. Each operator shall be responsible for those operations under the operator's direct control. Whenever there is doubt as to safety, the operator shall consult with the Program Coordinator before handling the loads.
- e. The operator shall activate the warning device when provided on a crane:
 1. Before starting the bridge or trolley motion of a crane.
 2. Intermittently during travel of the crane when approaching persons in the path of the load.
- f. Before leaving a crane or hoist unattended, the operator shall land any attached load, place controllers in the off position, and de-energize the main switch of the specific crane, if applicable.
- g. Before closing the main switch, if applicable, the operator shall be sure that all controllers are in the off position.
- h. If power goes off during operation, the operator shall immediately place all controllers in the off position. Prior to reuse of the crane or hoist, operating motions shall be checked for proper direction.
- i. The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known, the operator shall report them promptly to the Program Coordinator.
- j. The upper limit-device shall not be used as an operating control in normal operation unless additional means are provided to prevent damage from over-travel.
- k. The operator shall ensure that materials are not stored in a manner that may affect crane or hoist operation.
- l. The operator shall not cause the crane to lift, lower, or travel while anyone is on the load or hook.
- m. The operator should place the load block above head level when the hoist is not in use.
- n. The operator should not carry loads over people's heads.
- o. The operator shall check the hoist brake(s) at least once each shift if a load approaching the rated load is to be handled. This shall be done by lifting the load a short distance and applying the brake(s).
- p. The operator shall not lower the load below the point where two wraps of rope or chain remain on each anchorage of the hoisting drum unless a lower-limit device is provided, in which case, no less than one wrap shall remain.
- q. The operator shall not load the crane or hoist in excess of its rated load except for test purposes or for planned engineered lifts. EHS should be notified prior to performing an engineered lift.
- r. The operator shall never load the supporting structure in excess of its rated capacity.
- s. The operator shall be careful during the lift to prevent sudden acceleration or deceleration of the moving load.

- t. The operator shall ensure that the load does not contact obstructions during the lift.
- u. The operator shall not perform side pulls with the crane or hoist.
- v. Prior to attaching a load to a hoist, the operator shall also verify operation of the upper-limit device, if applicable, under no-load conditions. If the switch does not operate properly, the Program Coordinator should be notified immediately.
- w. The operator shall wear appropriate head, foot, and hand protection while operating the crane or performing rigging.

3.2. Slings and Rigging

3.2.1. Design and Construction

All manufactured and fabricated components of slings must meet the general design and testing provisions outlined by ASME B30.9. Fabricated components or components not covered within ASME B30.9 shall not be used unless approved by the sling manufacturer or a qualified person.

3.2.2. Proof Testing

Prior to initial use, all slings shall be proof tested or documentation of the proof test should be available, if applicable, in accordance to the proof test requirements outlined in ASME B30.9 for each sling type.

3.2.2.1. Alloy Chain Slings

Prior to initial use, all new and repaired chain and components of an alloy steel chain sling, either individually or as an assembly, shall be proof tested by the sling manufacturer or a qualified person.

3.2.2.2. Wire Rope Slings

Prior to initial use, all new swaged sockets, poured sockets, turn-back eyes, and mechanical joint endless wire rope slings shall be proof tested by the sling manufacturer or a qualified person. Prior to initial use, all wire rope slings incorporating previously used or welded fittings and all repaired slings shall also be proof tested by the sling manufacturer or a qualified person. All other new wire rope slings are not required to be proof tested prior to use.

3.2.2.3. Metal Mesh Slings

Prior to initial use, all new and repaired metal mesh slings shall be proof tested by the sling manufacturer or a qualified person.

3.2.2.4. Synthetic Rope, Webbing and Round Slings

Prior to initial use, all synthetic fiber rope slings incorporating previously used or welded fittings and all repaired slings shall be proof tested by the manufacturer or a qualified person. All other new synthetic fiber rope slings and fittings are not required to be proof tested prior to use.

3.2.3. Sling Identification

The initial sling identification shall be done by the sling manufacturer or by the qualified person that certified the sling. Sling identification tags should be maintained so as to be legible during the lifetime of the sling. Replacement of sling identification shall be recorded as a repair and the sling shall be removed from service in the event that the identification tag is damaged, missing, or illegible.

All sling identification shall include the following information:

- a. Certifier name or trademark or manufacturer;
- b. Number of legs;
- c. Rated loads for at least one hitch type and the angle at which it is based; and
- d. Individual unique sling identification (i.e. serial number).

Chain sling identification shall include the following additional information:

- a. Grade;
- b. Nominal chain size; and
- c. Length.

Wire rope sling identification shall include the following additional information:

- a. Diameter or size.

Wire mesh sling identification shall include the following additional information:

- a. Width and gauge.

Synthetic rope and webbing sling identification shall include the following additional information:

- a. Type of synthetic material.

Synthetic round sling identification shall include the following additional information:

- a. Type of core material; and
- b. Type of cover material.

3.2.4. Inspection

3.2.4.1. Initial Inspection

New, altered, modified, or repaired slings shall be inspected prior to use by a qualified person in accordance to [Section 3.2.4.3](#).

3.2.4.2. Frequent Inspection

A frequent visual inspection for damage shall be performed by a designated person in accordance to the frequent inspection checklist ([See Appendix I](#)). Slings shall be removed from service if any condition/discrepancy meets the removal criteria specified in the frequent inspection checklist or if any other unspecified hazard is identified by personnel. Slings shall not be returned to service until approved by a qualified person.

3.2.4.3. Periodic Inspection

The periodic inspection is a complete documented inspection of slings and associated components. The periodic inspection shall be performed monthly unless the usage of the sling is considered "severe" or "special" by a qualified person. In this case, the lesser inspection interval, as specified by the qualified person, shall be used for the sling. The Program Coordinator is responsible for overseeing periodic inspections and determining whether slings are to be removed from service. The periodic inspection form ([See Appendix J](#)) shall be completed during the periodic inspection of slings. Slings shall be removed from service if any condition/discrepancy meets the removal criteria specified in the frequent inspection checklist or if any other unspecified hazard is identified by personnel.

3.2.5. Repairs and Replacements

Slings shall only be repaired by the sling manufacturer or by a qualified person. The identification tags shall be updated to reflect any changes, including the name of the qualified individual that certified the repair. All repairs, replacements, and proof testing shall comply with the provisions of ASME B30.9.

3.2.6. Rigging

The rope or chain used by the hoist shall not be wrapped around the load like a sling. The load shall be attached to the rope or chain hook by means of slings or other devices. Slings having suitable characteristics for the type of load, hitch, and environment shall be selected in accordance with the requirements of ASME B30.9. All rigging shall be performed by a designated rigging person. The rigging person shall confirm that:

- a. The sling and rope or chain used by the hoist appears to be in condition as specified in [Appendix I](#).

- b. The sling is clear of all obstacles.
- c. The load, sling, or lifting device is seated in the bowl of the hook.
- d. The load is secured, balanced, and positioned in the hook, sling, or lifting device before the load is lifted more than a few inches.
- e. The hoist rope or chain is not kinked or twisted.
- f. Multiple part lines or legs are not twisted around each other.
- g. The hook is brought over the load in such a manner as to minimize swinging.
- h. The rope is seated in the drum grooves and in the sheaves, if there is or has been a slack rope condition. Care shall be exercised when removing a sling from under a landed and blocked load.

The following additional rigging practices shall also be followed as applicable:

- a. Slings shall be shortened or adjusted only by methods approved by the sling manufacturer or a qualified person.
- b. Slings shall not be shortened or lengthened by knotting or twisting.
- c. The sling shall be hitched in a manner providing control of the load.
- d. Slings in contact with edges, corners, or protrusions should be protected with a material of sufficient strength, thickness, and construction to prevent damage.
- e. Shock loading should be avoided.
- f. Loads should not be rested on the sling.
- g. Slings should not be pulled from under a load when the load is resting on the sling.
- h. During lifting, with or without a load, personnel shall be alerted about possible snagging.
- i. When using multiple basket or choker hitches, the load should be rigged to prevent the sling from slipping or sliding along the load.
- j. When using a basket hitch, the legs of the sling should contain or support the load from the sides, above the center of gravity, so that the load remains under control.
- k. Slings should not be dragged on the floor or over an abrasive surface.
- l. In a choker hitch, the choke point should only be on the sling body, not on a slice or fitting.
- m. In a choker hitch, an angle of choke less than 120 degrees should not be used without reducing the rated load.
- n. An object in the eye of a sling should not be wider than one half the length of the eye.
- o. Slings made with wire rope clips shall not be used as a choker hitch.
- p. All hooks must be equipped with a safety latch to prevent loads from bouncing off of the hook.

3.2.7. Additional Precautions

All portions of the human body shall be kept from between the sling and the load, and from between the sling and the crane hook or hoist hook. Personnel should never stand in line with or next to the leg(s) of a sling that is under tension. Personnel shall not stand or pass under a suspended load, and personnel shall wear personal protective head, foot, and hand protection while rigging.

4. TRAINING AND RECORDKEEPING

4.1. Training and Retraining

The supervising departments are responsible for providing relevant training and designating crane and hoist operators, signal persons, and operators. The Program Coordinator is responsible for validating operational competency for crane and hoist operators through a practical operating examination as specified in Section 3.1.5.1. Crane operators shall also be trained in the proper operation and care of fire extinguishers. Retraining shall be provided for all designated employees whenever there is a change in machines, equipment or processes that presents a new hazard. Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever the supervising department has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the required provisions within this program. The training shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

4.2. Recordkeeping

A copy of the records specified in this section shall be accessible to EHS upon request to the department Program Coordinator.

4.2.1. *Designated Persons List*

Program Coordinators shall maintain a current list of designated crane and hoist operators, signal persons, and rigging persons.

4.2.2. *Employee Training*

Program Coordinators shall maintain employee training records for designated persons that contain the employee name, date of training, and the subject of the training. Employee training records shall be maintained for the duration of employment plus five years.

4.2.3. *Crane and Hoist Operator Examination Forms*

Program Coordinators shall maintain crane and hoist operator examination forms ([See Appendix G](#)). Examination forms shall be maintained for the duration of employment plus five years.

4.2.4. *Periodic Inspection Forms*

Program Coordinators shall maintain periodic inspection forms ([See Appendices F and J](#)). The periodic inspection forms shall be maintained for lifetime of the crane, hoist, or sling(s) plus five years.

4.2.5. *Equipment Modification, Repair, and Replacement Records*

Program Coordinators are responsible for maintaining copies of equipment repair or replacement records and associated information for the lifetime of the crane, hoist, or sling(s) plus five years.

4.2.6. *Crane and Hoist Load Tests*

Program Coordinators shall maintain copies of all crane and hoist load tests.

5. REFRENECES

- [Indiana University Control of Hazardous Energy Program](#)
- [29 CFR 1910.179](#)
- [29 CFR 1910.184](#)
- ASME B30.2
- ASME B30.9

6. REVISIONS

New Document: August 13, 2014

Revised Document: October 24, 2017

APPENDIX A – GLOSSARY

Abnormal Operating Conditions: Environmental conditions that are unfavorable, harmful, or detrimental to or for the operation of a crane, such as excessively high or low ambient temperatures, exposure to adverse weather, corrosive fumes, dust-laden or moisture-laden atmospheres, and hazardous locations.

Angle of Choke: Angle formed in a sling body as it passes through the choking eye or fittings.

Angle of Loading: The acute angle between the horizontal and the leg of the rigging, often referred to as horizontal angle.

Brake: A device, other than a motor, used for retarding or stopping motion by friction or power means.

Bridge: The part of a crane consisting of one or more girders, trucks, etc. that carries the trolley or trolleys.

Bridge Travel: The crane movement in a direction parallel to the crane runway.

Bumper: A device for reducing impact when a moving crane or trolley reaches the end of its permitted travel, or when two moving cranes or trolleys come into contact. This device may be attached to the bridge, trolley, or runway stop.

Crane: A machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism being an integral part of the machine.

Designated Person: A person selected or assigned by the department as being competent to perform specific duties.

Drum: The cylindrical member around which the ropes are wound for lifting or lowering the load.

End Truck: An assembly consisting of the frame and wheels which support the crane girder(s) and allow movement along the runway.

Eye Opening: The opening in the end of a sling for the attachment of the hook, shackle, or other lifting device or the load itself.

Fitting: Hardware on the end of a sling.

Gantry Crane: A crane similar to an overhead crane, except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway.

Hitch Choker: A method of rigging a sling in which the sling is passed around the load, then through one loop eye, end fitting, or other device, with the other loop eye or end fitting attached to the lifting device. This hitch can be achieved with a sliding choker hook or similar device.

Hoist: A machinery unit that is used for lifting or lowering an object.

Limit Device: A device that is operated by some part or motion of a power-driven hoist, trolley, or bridge to limit motion.

Limit Switch: A device that is actuated by the motion of a part of a power-driven machine or equipment to alter or disconnect the electric, hydraulic, or pneumatic circuit associated with the machine or equipment.

Latch Hook: A type of hook with a mechanical device to close the throat opening of the hook.

Load: The total superimposed weight of the load block and hook.

Load Block: The assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope or load chain.

Main Switch: The primary hoist mechanism provided for lifting and lowering the rated load.

Master Switch: The switch which dominates the operation of contactors, relays, and other remotely operated devices.

Poured Socket: Fitting into which a wire rope can be inserted and then permanently attached by filling the cavity into which the wire rope was inserted with special molten metal or resin materials.

Primary Upper Limit Device: The first device that, when actuated, limits hoisting motion in the upward direction.

Qualified Person: A person who, by possession of a recognized degree in an applicable field or a certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

Overhead Crane: A crane with a single or multiple girder movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure. A monorail crane has one girder and a bridge crane has two girders.

Rated Load (Capacity): The maximum load designated by the manufacturer for which a crane or individual hoist is designed and built.

Reeving: A system in which a rope travels around drums or sheaves.

Runway: An assembly of rails, beams, girders, brackets, and framework on which the crane travels.

Semi-gantry Crane: A gantry crane with one end of the bridge rigidly supported on one or more legs that run on a fixed rail or runway, the other end of the bridge supported by an end truck running on an elevated rail or runway.

Severe Service: Service that involves normal or heavy service with abnormal operating conditions.

Sheave: A grooved wheel or pulley used with a rope to change direction and point of application of a pulling force.

Side Pull: The portion of the hoist pull acting horizontally when the hoist lines are not operated vertically.

Swaged Socket: Fitting into which a wire rope can be inserted and then permanently attached by mechanical compression applied to the shank that enclosed the rope.

Turn-Back: A mechanical splice in which the rope is looped back on itself and secured with one or more metal sleeves.

Trolley: The unit that travels on the bridge rails and supports the load block.

Trolley Travel: The trolley movement.

Wall Crane: A crane having a cantilever frame with or without trolley, and supported from a side wall or line of columns of a building.

APPENDIX B: APPLICABLE CRANE AND HOIST EXAMPLES

Example	Type
	Wall Crane
	Gantry Crane
	Semi-Gantry Crane
	Overhead Monorail Crane

Example

Type/Description



Overhead Bridge Crane



Electric Chain Hoist



Manual Lever Chain Hoist





Manual Chain Fall Hoist








Manual Come Along Hoist


Example**Type/Description**

 A red electric wire rope hoist with a motor, a drum, and a hook.	Electric Wire Rope Hoist
 A green pneumatic chain hoist with a motor, a chain, and a hook.	Pneumatic Chain Hoist

*This program may apply to other cranes and hoists not specified in this table.

APPENDIX C: APPLICABLE SLINGS

Example	Type
 A black steel alloy chain sling with a top ring and two bottom hooks.	Steel Alloy Sling
 A wire rope sling with two loops at each end.	Wire Rope Sling
 A synthetic rope sling with a black top ring and two yellow bottom hooks.	Synthetic Rope Sling
 A green synthetic round sling with a top ring and a bottom hook.	Synthetic Round Sling
 A yellow synthetic webbing sling with a top ring and a bottom hook.	Synthetic Webbing Sling

	Metal Mesh Sling
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*This program may apply to other slings not specified in this table.

APPENDIX D: INSPECTION MATRIX

	Initial Inspection <i>new, reinstalled, altered, repaired, modified or overloaded</i>	*Frequent Inspection <i>before put into service each day</i>	*Crane Periodic Inspection <i>annually at a minimum</i>	*Hoist Periodic Inspection <i>monthly at minimum</i>	*Slings Periodic Inspection <i>monthly at minimum</i>
Cranes	By Qualified Person	By Operator (Appendix E as Guideline)	Overseen by Program Coordinator. Documented on Appendix E and F.		
Hoists	By Qualified Person	By Operator (Appendix E as Guideline)		Overseen by Program Coordinator. Documented on Appendix E and F.	
Wire Ropes		By Operator (Appendix I as Guideline)	Overseen by Program Coordinator. Documented on Appendix J	Overseen by Program Coordinator. Documented on Appendix J.	
Alloy Chains		By Operator (Appendix I as Guideline)	Overseen by Program Coordinator. Documented on Appendix J	Overseen by Program Coordinator. Documented on Appendix J.	
Slings and Rigging	By Qualified Person	By Designated Person (Appendix I as Guideline)			Overseen by Program Coordinator. Documented on Appendix J.

*See Crane, Hoist, and Sling Safety Program for special exceptions.

APPENDIX E: FREQUENT INSPECTION CHECKLIST FOR CRANES AND HOISTS

Frequent Inspection Item (if applicable)	Yes*
Load rating is not marked on the crane, hoist, and supporting structure?	
At least 3 inches of overhead clearance and 2 inches laterally is not present between crane and obstructions?	
Controller functions are not labeled and/or not legible?	
Operational controls or functional operating mechanisms are not working properly, not properly adjusted, or there are unusual sounds?	
Upper limit switch not operating properly? It shall be tested with no load on the hook.	
Excessive wear on components of any operating mechanisms?	
Deterioration or leakage of lines, tanks, valves, pumps, and other parts of the air or hydraulic system?	
Excessive dirt, grease, or foreign matter?	
Deformation and/or cracking of the hook, load block, drums and/or sheaves?	
Safety latch on crane/hoist load block does not close automatically?	
Hoisting rope or chain and slings not inspected in accordance to the frequent sling inspection checklist (See Appendix I)?	

*Any condition/discrepancy identified by inspections that is determined to be a hazard to continued operation, shall be corrected by adjustment, repair, or replacement before continuing the use of the crane or hoist.

APPENDIX F: PERIODIC INSPECTION FORM FOR CRANES AND HOISTS

Periodic Inspection Information

Inspection Date	
Crane/Hoist Type	
Crane/Hoist ID	
Inspector Name	
Program Coordinator Name	

Periodic Inspection Item (if applicable)

Yes

Does the crane/hoist fail the frequent inspection? (See Appendix E)	
Any deformed, cracked, or corroded members?	
Are there worn, cracked, or distorted parts such as pins, bearings, wheels, shafts, gears, rollers, locking and clamping devices, bumpers, and stops?	
Is there excessive wear or improper operation of the brake system parts, linings, pawls, chain sprockets or ratchets?	
Any cracked or worn sheaves and drums?	
Are there loose or missing bolts, nuts, pins or rivets?	
Are there any signs of pitting or deterioration of controllers, master switches, contacts, limit switches, and push button stations?	
Are load, wind, and other indicators are not performing properly?	
Is any gasoline, diesel, electric, or other power plants not performing properly?	
Are stops not present at the limit of travel of the trolley?	
Corroded, cracked, bent, worn, or improperly applied end connections?	
Are there any gouges, nicks, weld spatter, corrosion, deformation, cracks?	
Has the hook throat opening increased 5%, not to exceed ¼ inch (6 mm), more than the normal throat opening measured at the narrowest point?	
Hoisting rope or chain and slings not inspected in accordance to the periodic sling inspection checklist (See Appendix I)?	

*Any condition/discrepancy identified by inspections that is determined to be a hazard to continued operation, shall be corrected by adjustment, repair, or replacement before continuing the use of the crane or hoist.

Participant Information

Inspector Signature	
Program Coordinator Signature	

*By signing this document, the signers attest that the information provided within this document is accurate and complete to the best of their knowledge and belief.

APPENDIX G: CRANE AND/OR HOIST OPERATOR EXAMINATION FORM

Examination Information

Examination Date	
Crane/Hoist Type	
Crane/Hoist Assembly ID	
Sling Type	
Sling ID	
Examinee Name	
Program Coordinator Name	

Examination Item

Pass



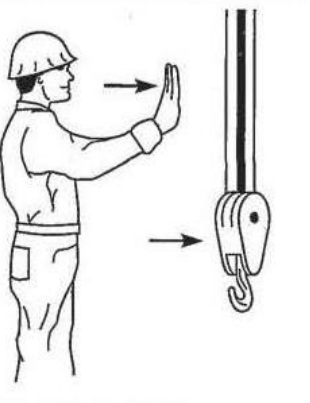

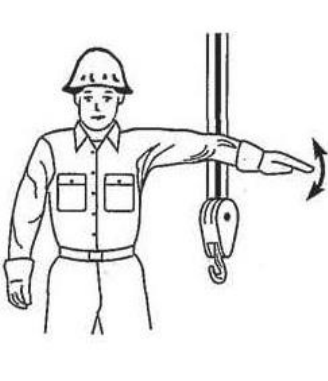
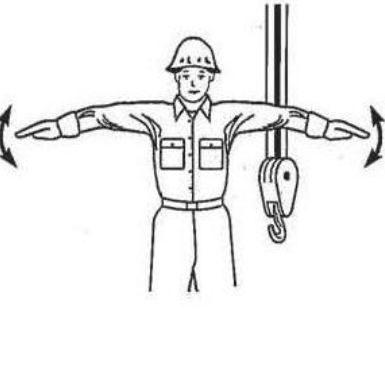
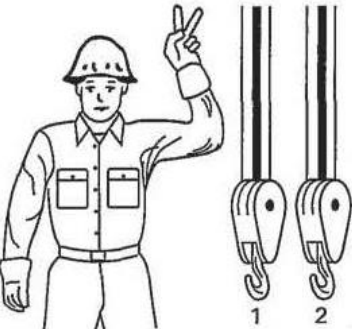
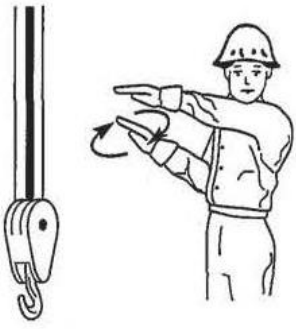
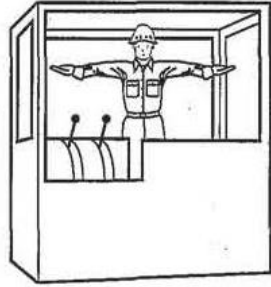
Did the examinee use the frequent inspection checklist appropriately?	
Was the weight capacity of the load identified to ensure that it did not exceed rated load capacities?	
Was the load properly secured, balanced, and stable before performing the lift?	
Was a destination clearly identified before performing the lift?	
Was the examinee familiar with all controls?	
Was the load speed and control satisfactory (i.e. no sudden stops or acceleration)?	
Was the examinee aware of activities in the vicinity including personnel and equipment?	
After the lift, was the crane and/or hoist properly slowed with the hook near the bottom of the hoist?	
Were slings stowed properly after the lift (i.e. not subject to mechanical, damage, moisture, corrosives, extreme temp., etc)?	

Examination Information

Examinee Signature	
Program Coordinator Signature	

*By signing this document, the Program Coordinator acknowledges that he/she has witnessed the examinee perform the frequent inspection correctly and the full cycle of a lift safely for the crane/hoist assembly as specified above. By signing this document, the examinee acknowledges that he/she has read and agrees to comply with the Crane, Hoist, and Sling Safety Program, as applicable, and to immediately notify the Program Coordinator of any discrepancies found during a frequent or periodic inspection.

APPENDIX H: STANDARD HAND SIGNALS FOR SIGNALING

 <p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>	 <p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.</p>	 <p>BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>
 <p>TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.</p>	 <p>STOP. Arm extended, palm down, move arm back and forth horizontally.</p>	 <p>EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.</p>
 <p>MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.</p>	 <p>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.)</p>	 <p>MAGNET IS DISCONNECTED. Crane operator spreads both hands apart — palms up.</p>

*Image courtesy of ASME B30.2.

APPENDIX I: FREQUENT INSPECTION CHECKLIST FOR SLINGS, ROPES, AND CHAINS

Frequent Inspection Items by Type

Chain Slings and Other Chains for Hoisting

Yes*

Nicks, cracks, breaks, stretches, distortions, twists, gouges, bends, or damaged links and parts?	
Heat damage, discoloration, or worn?	
Lack of ability of the chain or components to hinge (articulate) freely?	
Pitting, corrosion or weld splatter?	
Missing or illegible chain identifications?	
Other conditions that cause doubt as to the continued safe use of the chain?	

Wire Rope Slings and other Wire Ropes for Hoisting

Yes*

Broken wires?	
Pitting or corrosion?	
Localized wear (shiny worn spots), abrasion or scrapes?	
Damage or displacement of end fittings, hooks, rings, links, or collars?	
Distortions, kinks, bird caging, crushing, or other evidence of damage to wire rope structure?	
Missing or illegible sling identifications?	
Other conditions that cause doubt as to the continued safe use of the sling?	

Wire Mesh Slings

Yes*

Broken weld or brazed joints?	
Broken wire in any part of the mesh?	
Abrasion, corrosion, distortion, pitting, twisting, bending, cracking, gouging of any component?	
Lack of flexibility?	
Missing or illegible sling identifications?	
Other conditions that cause doubt as to the continued safe use of the sling?	

Synthetic Rope, Webbing, and Round Slings

Yes*

Melting, charring or burning of any part of the surface?	
Hard or stiff areas, snags, punctures, tears, cuts, fraying, broken or worn stitches?	
Change in diameter or width?	
Discoloration?	
Wear or elongation exceeding the amount recommended by the manufacturer?	
Distortion of fittings?	
Missing or illegible sling identifications?	
Other conditions that cause doubt as to the continued safe use of the sling?	

*Slings and/or other chains or wire rope used for hoisting shall be removed from service if any of the conditions are present.

APPENDIX J: PERIODIC INSPECTION FORM FOR SLINGS, ROPES, AND CHAINS

Periodic Inspection Information

Inspection Date	
Inspector Name	
Program Coordinator Name	

Sling ID	Types	Pass*

*Checking the pass checkbox indicates that no hazards or conditions/discrepancies were present that required repair, replacement, or removal from service.

Participant Information

Inspector Signature	
Program Coordinator Signature	

*By signing this document, the signers attest that the information provided within this document is accurate and complete to the best of their knowledge and belief.