CRANE, HOIST AND SLING SAFETY PROGRAM

REGULATORY STANDARD:  
OSHA - 29 CFR 1910.179 and 184  
ANSI - B30.2 and 30.9  
Crane Manufacturers Association of America 61

BASIS:  The Occupational Safety and Health Administration (OSHA) estimates that most crane, hoist and sling accidents can be prevented if proper safety precautions at job sites are initiated. The OSHA Sling Safety Regulatory Standard establishes uniform requirements to ensure that the hazards associated with the use of cranes, hoists and slings in U.S. workplaces are evaluated, safety procedures implemented, and that the proper hazard information is transmitted to all affected workers.

GENERAL:  The company will ensure that all slings used within our facility are evaluated. This safety program is intended to address comprehensively the issues of evaluating and identifying serviceable and unserviceable slings, evaluating the associated potential hazards, communicating information concerning these hazards, and establishing appropriate procedures and protective measures for employees.

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Overhead Cranes, Hoists, and Slings

1. **Purpose.** Each facility or site which uses overhead cranes, hoists and slings require processes in place to ensure proper procurement, maintenance, testing, inspection and safe operation of internally used overhead cranes and hoists, and sling equipment. Mobile cranes (like those used outside at construction sites) are excluded.

2. **Scope.** This program applies to all company owned, leased or operated overhead cranes, hoists, and slings.

3. **Responsibilities.**

   3.1 **Management and Supervisor:**

   3.1.1 Purchase only equipment that is approved by the American National Standards Institute (ANSI B-30.2).

   3.1.2 Test equipment as needed or required, or contract with the installation firm or manufacturer to perform required tests.

   3.1.3 Ensure operators inspect equipment daily or before each use.

   3.1.4 Assess the operations to assure that cranes and hoists are operating properly.

   3.1.5 Assess operator behavior to assure that equipment is used properly. Retrain or replace operators whose behavior exhibits deficiencies.

   3.1.6 Train operators, inspectors, and assure the Crane and Hoist Designated Person has the appropriate knowledge and skills to perform their required duties.

   3.1.7 Assure that repairs, modifications and maintenance of crane and hoist equipment are performed in a timely manner, and on a regular basis. Modifications must be approved by a professional engineer or the manufacturer.

   3.2 **Crane Operators:**

   3.2.1 Operators will conduct visual crane and hoist inspections frequently (daily or before each use is recommended, although monthly inspection is the minimum). A crane and hoist inspection form is provided for this purpose.

   3.2.2 Cranes that have been idle for a period of one month or more will be inspected by the designated “Hoist & Crane Designee” before the crane is put back into service.

   3.2.3 Operators' skills, knowledge, and operating behaviors are routinely assessed by Supervisors. Deficiencies will be addressed through re-training or replacement of the operator.
3.2.4 Appropriate preventive maintenance inspection cycles are established, based on manufacturer's recommendations and/or the Hoist & Crane Designee recommendations. Modifications made must be approved by a professional engineer or the manufacturer.

3.2.4.1 Follow all company work practices and manufacturer's recommendations to ensure safe operation of the equipment and ancillary materials.

3.3 Crane and Hoist Designee:

3.3.1 This person must have qualifications that meet the approval of the Hoist & Crane regulations. In addition, this person must understand the maintenance qualifications, frequency of inspection, documentation and recordkeeping requirements. It is recommended that this person be (or have access to) a professional engineer to provide appropriate consultation on load capacity and other approvals required.

3.3.2 Be responsible for inspections, documentation and records for cranes, hoists and slings used at the company.

3.3.3 Provide inspections for cranes that have been idle for one month or more.

3.3.4 Assure registration stickers with appropriate registration numbers are affixed to the crane, hoist and/or sling.

3.3.5 Assure cranes are affixed with their rated load capacity.

3.3.6 Provide approvals for (or consult with a professional engineer or the manufacturer to approve) any activity where the rated load of a crane may be exceeded. In no case may a hoist’s rated load capacity be exceeded.

3.4 Manufacturer or Installer:

3.4.1 Provide for initial testing of cranes, hoists and slings. Testing includes hoisting and lowering, trolley travel, bridge travel, limit switches and locking and safety devices, and rated load testing.

3.4.2 Provide consultation services for loading capacity, modifications, repairs and other items as needed or required.

3.4.3 Provide all repairs and service for slings.

3.5 Maintenance Personnel:

3.5.1 Perform required preventive maintenance services on crane and hoist equipment, per manufacturer’s recommendations. Slings must be repaired and serviced only by the manufacturer.
3.5.1.1 Adjustments of operating mechanisms, limit switches, control systems, brakes and power sources may be performed by company personnel, under the direction of either a professional engineer or other designated person who has the qualifications to perform such repairs on crane and hoist equipment.

3.5.1.2 Repairs must be made to cranes and hoists only under the approval and oversight of either the manufacturer or a professional engineer.

4. Procedure.

4.1 General:

4.1.1 Cranes and hoists are procured through and registered with the site designated unit or through the outside company contracted to manage hoists and cranes. The Hoist & Crane Designee will apply a registration sticker with the hoist or crane's designated registration number. This sticker must remain legible from the floor.

4.1.2 Load testing, hoisting and lowering, trolley travel, bridge travel and limit locking and safety devices must be performance tested (in accordance with ANSI B-30.2b) upon initial installation or after any modifications or alterations to the equipment. Testing does not need to be performed for change-outs of chain, wire rope or cables.

4.1.3 Operators and their supervisors are properly trained for the operations they are expected to perform and on the equipment to which they are assigned. (Training is required to be documented.). Operation of any overhead crane or hoist without proper training and authorization is forbidden.

4.2 Safe Work Practices for Crane and Hoist Operators:

4.2.1 At a minimum, operators will:

4.2.1.1 Pay constant attention to hoist/crane while load is suspended.

4.2.1.2 Never exceed the rated load.

4.2.1.3 Never leave a suspended load unattended.

4.2.1.4 Position/center load for balance.

4.2.1.5 NOT perform side-pull lifts.

4.2.1.6 NOT lift with kinked or damaged chain, cable, or rope.

4.2.1.7 NOT lift loads over people.
4.2.1.8 IMMEDIATELY stop and report any malfunctioning device to Supervisors. IN THE EVENT OF IMMEDIATE DANGER, lower the load, lock out the crane power source, and immediately contact the site emergency number. If unable to safely lower the load, control the immediate area while others contact emergency responders.

4.2.1.9 For cab-operated cranes, maintain cab access clear and clean and perform documented monthly inspections of cab fire extinguisher.

4.2.1.10 Follow direction from persons trained to provide correct hand signals when assisted lifts are conducted.

4.2.1.11 Never allow persons to ride hook or load.

4.2.2 Be responsible and accountable for the safety of the load, regardless of who attached it.

4.3 Safe Work Practices for Sling Operators:

4.3.1 Slings that are damaged or defective will not be used.

4.3.2 Slings will not be shortened with knots or bolts or other makeshift devices.

4.3.3 Sling legs will not be kinked.

4.3.4 Slings will not be loaded in excess of their rated capacities.

4.3.5 Slings used in a basket hitch will have the loads balanced to prevent slippage.

4.3.6 Slings will be securely attached to their loads.

4.3.7 Slings will be padded or protected from the sharp edges of their loads.

4.3.8 Suspended loads will be kept clear of all obstructions.

4.3.9 All employees will be kept clear of loads about to be lifted and of suspended loads.

4.3.10 Hands or fingers will not be placed between the sling and its load while the sling is being tightened around the load.

4.3.11 Shock loading is prohibited.

4.3.12 A sling will not be pulled from under a load when the load is resting on the sling.

4.3.13 Before being lifted completely from its resting position, loads will be checked for proper balance.

4.3.14 Unapproved makeshift slings such as fan belts will never be used.
4.4 Handling Loads:

4.4.1 Size of load.

4.4.1.1 The crane may not be loaded beyond its rated load except for testing purposes.

4.4.2 Attaching the load.

4.4.2.1 Ropes must be free from kinks or twists and not be wrapped around the load.

4.4.2.2 Loads are attached to the block hook by slings or other approved devices, taking care that the slings clear all obstacles.

4.4.3 Moving the load.

4.4.3.1 Loads must be secure and balanced in the sling or lifting device before it is lifted (even more than a few inches).

4.4.3.2 Before starting check for the following:

4.4.3.2.1 Hoist rope is not kinked.

4.4.3.2.2 Multiple part lines are not to be twisted around each other.

4.4.3.2.3 Hooks are brought over the load to prevent swinging.

4.4.3.3 During hoisting care will be taken that:

4.4.3.3.1 There is no sudden acceleration or deceleration.

4.4.3.3.2 The load does not contact any obstructions.

4.4.3.4 Cranes may not be used for side pulls.

4.4.3.5 Employees may not be on the hook (riding it or gliding with it) during movement.

4.4.3.6 Loads may not be carried over people.

4.4.3.7 Operators must test the brakes when the rated load capacity of the crane or hoist is approached. Testing is by raising the load a few inches and applying the brakes.

4.4.3.8 At least two full wraps of rope must remain on the drum at all times.
4.4.3.9 When two or more cranes are used to lift a load one qualified responsible person must be designated to be in charge of the operation. They will analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

4.4.3.10 Operators must remain at the controls at all times when loads are suspended.

4.4.3.11 A warning signal must activate when the bridge starts and when the load or hook approaches personnel.

4.4.4 Hoist limit switches.

4.4.4.1 Upper limit switches must be no-load tested at the beginning of each operator's shift. Extreme care must be used; the block is "inched" into the limit or run in at slow speed. If the switch does not operate properly, the crane may not be used until repaired.

4.4.4.2 The hoist limit switch, which controls the upper limit of travel of the load block, may never be used as an operating control.

4.4 Markings:

4.4.1 All cranes, hoists and slings will be labeled with their registration number by the Hoist & Crane Designee. These registration numbers must be legible from the floor.

4.4.2 Monorails must be labeled with their rated weight load capacity. Multiple hoists applied to a single monorail may not exceed the total rated capacity of the monorail without specific approval of the Hoist & Crane Designee. Markings must be legible from the floor.

4.4.3 Hoists and slings must be marked with their rated weight load capacity. Under no circumstances may a rated capacity be exceeded on a hoist. Markings must be legible from the floor.

4.4.4 Cranes are required to be marked with their rated weight load capacity on each side of the crane. Markings must be legible from the floor. If more than one number appears on the marking (e.g. 20/5) the larger number is the total rated capacity and will not be exceeded.

4.5 Repairs/Modifications and Testing:

4.5.1 Cranes and Hoists

4.5.1.1 All repairs and modifications to new and existing crane and hoist systems are made by a professional engineer or the manufacturer.

4.5.1.2 Adjustments to crane and hoist equipment may be performed by qualified personnel under the direct instruction of either a professional engineer or the manufacturer.
4.5.1.3 Cranes must be tested upon initial installation and after alterations.

4.5.2 Slings

4.5.2.1 Sling repairs and modifications must be made by the manufacturer.

5. Safety Information.

5.1 Cranes and Hoists:

5.1.1 General (See Crane and Hoist Construction and Installation Requirements form for more detailed information.)

5.1.1.1 Wind indicators and rail clamps for outdoor storage bridges will be in place. A visible or audible alarm must be provided to warn the operator of winds exceeding a set velocity. (Velocity is set based on the capabilities of the crane.)

5.1.1.2 Clearance from any obstruction must be maintained at a minimum of 3 inches overhead and 2 inches laterally.

5.1.1.3 Passageways and walkways (including those used to maintain crane equipment) must be free from obstruction, and be located so they do not jeopardize the safety of any employee on the walkway.

5.1.1.4 Parallel cranes must have adequate space between bridges so that hoisted materials and the crane equipment is not at risk.

5.1.1.5 If there is at least 48 inches of headroom available, foot-walks should be provided on cab-operated cranes along the length of the bridge.

5.1.1.6 Controls must be visible (well lighted) and located within convenient reach of the operator when facing the load and/or direction of travel of the cab. Load hook must be in full view at all times.

5.1.1.7 Fire extinguishers may be of any type except Carbon Tetrachloride. Cab operators must be trained and familiar with their use.

5.1.1.8 Brakes (control and holding types) must be provided that adequately slow and stop the crane, and which hold the load.

5.1.1.9 Electrical equipment and components will comply with OSHA’s Electrical Safety requirements.

5.1.1.10 Hoisting equipment (sheaves, ropes and hooks) will be smooth and free from defects or damage. They must be inspected frequently.

5.1.1.11 Warning devices and alarms must be installed for all cranes (except floor operated cranes) that have power traveling mechanisms.
5.1.1.12 Ladders must be free from obstruction and other encumbrances during use. Articles that are too large for pockets or belt attachments must be lifted and lowered by a hand line.

5.1.1.13 Cabs must be kept neat so that personal items do not interfere with the operation or access to controls. Tools, oil cans, waste, extra fuses, and other necessary articles should be stored in a tool box.

5.2 Slings:

5.2.1 General (See Crane Hoist and Sling Maintenance Testing and Inspection form for more detailed information.)

5.2.1.1 Operators must be trained by the manufacturer or other certified agency.

5.2.1.2 Slings and their components must be inspected daily, periodically and on a regular schedule.

5.2.1.3 Damaged equipment may not be used until repaired by the manufacturer.

5.2.1.4 Slings and their components must have identification permanently affixed that designates the size, grade rated capacity and reach.

5.2.1.5 Slings must be manufacturer tested before being placed into service.

5.2.1.6 Slings are rated for temperature ranges. If materials or temperatures exceed this range, the sling or component must be re-tested by the manufacturer.

5.2.1.7 Types of slings include:

5.2.1.7.1 Alloy steel chain

5.2.1.7.2 Wire rope

5.2.1.7.3 Metal mesh

5.2.1.7.4 Natural or Synthetic fiber rope

5.2.1.7.5 Synthetic web

6. Training and Information.

6.1 All employees working near crane, hoist and sling operations must be made aware of the hazards associated with the use of the equipment.

6.1.1 Specialized or one-time lifts must have information and training provided prior to the lift.
6.2 Initial training must occur for crane, hoist and sling operators prior to initial job assignment and use of equipment. Training includes:

6.2.1 Pre-operational inspection requirements (including verification of markings on the equipment and components).

6.2.2 Specific operational requirements.

6.2.3 Principles of operations.

6.2.4 Hazard recognition associated with the work.

6.2.5 Load determination and balancing.

6.2.6 Process to remove equipment or components from service.

6.3 Training must be documented. Documentation must be retained as long as the operator is required to use the equipment.

6.3.1 Training for cranes and hoists is performed by the manufacturer or other certified agency.

6.3.2 Training for sling use may be provided by an experienced employee who has had previous training provided by the manufacturer, although it is more common for the manufacturer or installer of the sling to provide the required operator training.

6.3.3 Training for sling inspection is provided to operators by the manufacturer.

6.4 Refresher training is identical to initial training and is required when there is a change in the job assignment or equipment used, when procedures change and when operator behavior warrants retraining.

6.5 Operators must be physically and mentally capable of performing their duties and understanding the safe use of cranes, hoists and slings.

6.6 Fire extinguishers may be of any type except Carbon Tetrachloride. Cab operators must be trained and familiar with their use.

7. Definitions.

- **Hoist & Crane Designee** - If a designee is utilized for approval of hoist and/or crane activities, they must have qualifications that meet the approval of the Hoist & Crane regulations. In addition, this person must understand the maintenance qualifications, frequency of inspection, documentation and recordkeeping requirements. It is recommended that this person be (or have access to) a professional engineer to provide appropriate consultation on load capacity and other approvals required.
Qualified person - A person who, by possession of a recognized degree 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.

Designated - Selected by management as being competent to perform specific duties.

Crane - A mechanism used for lifting or lowering a load and moving it horizontally.

Hoist - A suspended mechanism that exerts a force for lifting or lowering a load. May be part of a crane.

Monorail - A single run of overhead track on which hoists travel.

Sling – A hammock, net or similar device used with hoists or cranes to carry a suspended load.

Angle of loading - The inclination of a leg or branch of a sling measured from the horizontal or vertical plane as shown in Fig. N-184-5 of 29 CFR 1910.184; provided that an angle of loading of five degrees or less from the vertical may be considered a vertical angle of loading.

Basket hitch - A sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes or handles on the hook or a single master link.

Braided wire rope - A wire rope formed by plaiting component wire ropes.

Bridle wire rope sling - A sling composed of multiple wire rope legs with the top ends gathered in a fitting that goes over the lifting hook.

Cable laid endless sling mechanical joint- A wire rope sling made endless by joining the ends of a single length of cable laid rope with one or more metallic fittings.

Cable laid grommet-hand tucked - An endless wire rope sling made from one length of rope wrapped six times around a core formed by hand tucking the ends of the rope inside the six wraps.

Cable laid rope - A wire rope composed of six wire ropes wrapped around a fiber or wire rope core.

Cable laid rope sling mechanical joint - A wire rope sling made from a cable laid rope with eyes fabricated by pressing or swaging one or more metal sleeves over the rope junction.

Choker hitch - A sling configuration with one end of the sling passing under the load and through an end attachment, handle or eye on the other end of the sling.

Coating - An elastomer or other suitable material applied to a sling or to a sling component to impart desirable properties.

Cross rod - A wire used to join spirals of metal mesh to form a complete fabric. (See Fig. N-184-2 of 29 CFR 1910.184.)
- **Designated** - Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

- **Equivalent entity** - A person or organization (including an employer) which, by possession of equipment, technical knowledge, and skills, can perform with equal competence the same repairs and tests as the person or organization with which it is equated.

- **Fabric (metal mesh)** - The flexible portion of a metal mesh sling consisting of a series of transverse coils and cross rods.

- **Female handle (choker)** - A handle with a handle eye and a slot of such dimension as to permit passage of a male handle thereby allowing the use of a metal mesh sling in a choker hitch. (See Fig. N-184-1 of 29 CFR 1910.184.)

- **Handle** - A terminal fitting to which metal mesh fabric is attached. (See Fig. N-184-1 of 29 CFR 1910.184.)

- **Handle eye** - An opening in a handle of a metal mesh sling shaped to accept a hook, shackle or other lifting device. (See Fig. N-184-1 of 29 CFR 1910.184.)

- **Hitch** - A sling configuration whereby the sling is fastened to an object or load, either directly to it or around it. Link is a single ring of a chain.

- **Male handle (triangle)** - A handle with a handle eye.

- **Master coupling link** - An alloy steel welded coupling link used as an intermediate link to join alloy steel chain to master links. (See Fig. N-184-3 of 29 CFR 1910.184.)

- **Master link or gathering ring** - A forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling. (See Fig. N-184-3 of 29 CFR 1910.184.)

- **Mechanical coupling link** - A non-welded, mechanically closed steel link used to attach master links, hooks, etc., to alloy steel chain.

- **Proof load** - The load applied in performance of a proof test.

- **Proof test** - A nondestructive tension test performed by the sling manufacturer or an equivalent entity to verify construction and workmanship of a sling.

- **Rated capacity or working load limit** - The maximum working load permitted by the provisions of this section.

- **Reach** - The effective length of an alloy steel chain sling measured from the top bearing surface of the upper terminal component to the bottom bearing surface of the lower terminal component.

- **Selvage edge** - The finished edge of synthetic webbing designed to prevent unraveling.

- **Sling** - An assembly which connects the load to the material handling equipment.
Sling manufacturer - A person or organization that assembles sling components into their final form for sale to users.

Spiral - A single transverse coil that is the basic element from which metal mesh is fabricated. (See Fig. N-184-2 of 29 CFR 1910.184.)

Strand laid endless sling-mechanical joint - A wire rope sling made endless from one length of rope with the ends joined by one or more metallic fittings.

Strand laid grommet-hand tucked - An endless wire rope sling made from one length of strand wrapped six times around a core formed by hand tucking the ends of the strand inside the six wraps.

Strand laid rope - A wire rope made with strands (usually six or eight) wrapped around a fiber core, wire strand core, or independent wire rope core (IWRC).

Vertical hitch - A method of supporting a load by a single, vertical part or leg of the sling. (See Fig. N-184-4 of 29 CFR 1910.184.)

8. Summary. Each facility or site which uses overhead cranes, hoists and slings require processes in place to ensure proper procurement, maintenance, testing, inspection and safe operation of internally used overhead cranes and hoists, and sling equipment. Mobile cranes (like those used outside at construction sites) are excluded.

8.1 Basic Responsibilities:

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8.2 Training:

8.2.1 All employees working near crane, hoist and sling operations must be made aware of the hazards associated with the use of the equipment.

8.2.2 Training must be documented:

8.2.2.1 Initial training must occur for crane, hoist and sling operators prior to initial job assignment and use of equipment.
8.2.2.2 Refresher training is identical to initial training and is required when there is a change in the job assignment or equipment used, when procedures change and when operator behavior warrants retraining.

8.2.3 Fire extinguishers may be required.