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### **Policy**

All employees using lifting devices including mobile cranes or overhead cranes/hoists (e.g. manual, electric or air powered) will be properly trained in their safe use, inspection and maintenance to prevent injury to operating personnel and adjacent employees, and to prevent property damage from improper use. All cranes/hoists will be operated, inspected and maintained according to the requirements of this policy. Checklists and record-keeping requirements should be incorporated into each plant's site-specific policies and procedures.

### **Exhibits**

- Exhibit W1-1: Inspection & Maintenance Guide for Overhead Hoists
- Exhibit W1-2: Inspection & Maintenance Checklist for Overhead Hoists
- Exhibit W1-3: Chain Tension Relative to Configuration
- Exhibit W1-4: Monorail/Hoisting System Testing
- Exhibit W1-5: Mobile Crane Inspection Checklist
- Exhibit W1-6: Sling Inspection Checklist
- Exhibit W1-7: Sling Inspection and Use Guide

### **References**

- United States:** 29 CFR 1910.179 – Overhead and Gantry Cranes  
29 CFR 1910.108 Crawler Locomotive and Truck Cranes  
30 CFR 56/57.16000 and .19000 sections  
ANSI standard B30.16, Safety Standard for Overhead Hoists  
ANSI standard B30.23, Personnel Lifting Systems
- Canada:** Ontario – R.R.O. 1990, Reg. 854: Mines and Mining Plants  
Ontario – R.R.O. 1990, Reg. 851: Industrial Grupos de poder  
Quebec – S-2.1 - Act respecting occupational health and safety
- Mexico:** The Mexican Federal Labor Law

### **Components**

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## 1.0 Definitions

- 1.1 **Boom [crane]** – A member hinged to the front of the rotating superstructure with the outer end supported by ropes leading to a gantry or A-frame and used for supporting the hoisting tackle.
- 1.2 **Boom Angle** – The angle between the longitudinal centerline of the boom and the horizontal. The boom longitudinal centerline is a straight line between the boom foot pin (heel pin) centerline and boom point sheave pin centerline.
- 1.3 **Brake** – A device used for retarding or stopping motion by friction or power means.
- 1.4 **Bridge** – That part of a crane consisting of girders, trucks, end ties, footwalls and a drive mechanism which carries the trolley of trolleys.
- 1.5 **Bumper [buffer]** – An energy absorbing device for reducing impact when a moving crane or strolled reaches the end of its permitted travel; or when two moving cranes or trolleys come in contact.
- 1.6 **Cab-Operated Crane** – A crane controlled by an operator in a cab located on the bridge or trolley.
- 1.7 **Clearance** – The distance from any part of the crane to a point of the nearest obstruction.
- 1.8 **Counterweight** – A weight used to supplement the weight of the machine in providing stability for lifting working loads.
- 1.9 **Crane/hoist** – A machine for lifting and lowering a load and moving it vertically and/or horizontally, with the hoisting mechanism an integral part of the machine. Cranes and hoists include, but are not limited to overhead bridge cranes, single beam hoists, pendant and pedestal cranes and jib cranes.
- 1.10 **Critical Lift** – A lifting operation such as a non-routine lift, dual-pick lift or lift in a hazard area which, in the event of an accident, could cause unacceptable risk of personal injury; damage to equipment, materials, or other property damage; or significant delay of work.
- 1.11 **Drum** – The cylindrical member around which the ropes are wound for raising and lowering the load.
- 1.12 **Job** – An extension attached to the boom point to provide added boom length for lifting specified loads. The job may be in line with the boom or offset to various angles.
- 1.13 **Load Ratings** – Crane ratings established by the manufacturer.
- 1.14 **Mobile Crane** – A mobile powered machine for lifting and lowering a load and moving it vertically and/or horizontally, with the hoisting mechanism an integral part of the machine. Mobile cranes include but are not limited to wheel mounted or track mounted cranes, boom trucks, and service vehicle-mounted cranes and hoists.
- 1.15 **Overhead Hoist** – A crane with an overhead fixed hoisting mechanism or moveable bridge travelling on an overhead fixed runway structure.
- 1.16 **Outriggers** – Extendable of fixed arms, attached to the mounting base, which rest on supports at the outer ends.
- 1.17 **Periodic Inspections** – A visual inspection of a crane/hoist, performed by a competent person, typically a qualified third party.
- 1.18 **Pre-Use Inspection** – A visual inspection of a crane/hoist performed by an operator or maintenance worker prior to the use.
- 1.19 **Qualified Operator** – An individual having successfully completed documented training relative to the operation of the specific type of crane/hoist to be operated. A qualified operator must successfully demonstrate competency in skills and abilities required for safe operation of the

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specific type of crane/hoist to be operated and where required by State or Local laws, fulfilled all certification requirements of that jurisdiction.

- 1.20 Rope** – Wire rope, unless otherwise specified.
- 1.21 Swing** – The rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation.
- 1.22 Trolley** – The unit that travels on the bridge rails and carries the hoisting mechanism.
- 1.23 Truck** – The unit consisting of a frame, wheels, bearings and axles which supports the bridge girders or trolleys.

## **2.0 Scope**

- 2.1** This policy applies to all mobile cranes and overhead cranes/hoists (e.g. manual, electric and air powered lifting devices) to include cables, chains, hooks or sling lifting devices. The primary focus of this policy is tonnage rated lifting devices such as overhead hoists commonly found in maintenance shops or at strategic locations at plants where they are used for intermittent lifting of process equipment during repair or maintenance.
- 2.2** Devices such as come-alongs, screen deck pulley systems, supports for vibrators at conveyor tail pulleys, or other supports using cables and/or hooks are not the primary target of this policy, however, applicable portions of the policy that address wear and tear of components should be included in each site’s preventive maintenance program.
- 2.3** Only properly trained individuals are permitted to operate hoists.
- 2.4** All crane/hoist operators will be familiar with each hoist owner’s manual, especially concerning safety and maintenance procedures.

## **3.0 Responsibility**

- 3.1** The Plant Manager or designee is responsible for site-specific compliance.
- 3.2** Supervisors are responsible to ensure all employees assigned to operate hoisting equipment have received the proper training and are physically and mentally capable of doing so.
- 3.3** All employees are responsible for performing documented pre-use inspections of hoisting equipment.
- 3.4** All employees are responsible to report any identified hazard that cannot be corrected or controlled to their supervisor immediately.

## **4.0 Overhead Hoist Inspections.** Inspection of overhead hoists and components are in two categories; pre-use and periodic. Hoists must be maintained in accordance with manufacturer instruction.

- 4.1 Pre-Use Inspections.** Pre-use inspections must only be performed by qualified personnel. An overall inspection checklist similar to one developed by ANSI is provided as Exhibit W1-1. For each day that a hoist is used, and prior to hoist operation, a documented inspection shall be performed, including, but not limited to the following items:
  - 4.1.1 Electric or air powered hoists:**
    - 4.1.1.1** The upper and lower limit switches, or auto stop switch will be functionally tested
    - 4.1.1.2** The brake will be functionally tested
    - 4.1.1.3** The chain/cable and hook will be visually inspected for defects/abnormalities such as fraying, nicks, twists, and deformities.

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4.1.2 Manual hoists:

4.1.2.1 The chain/cable and hook will be visually inspected for defects/abnormalities such as fraying, nicks, twists, and deformities.

4.1.2.2 The hook(s) will be visually inspected for twists, increased throat distance, cracks, presence of safety clasps (on items where clasps were part of the original hook) and other defects

4.1.2.3 The mechanical system/housing will be visually inspected for functionality.

4.1.3 All defects during inspection shall be documented on a daily inspection form. Any defect(s) which may affect safe operation of the hoist shall result in the hoist being immediately taken out of service by means of tagging and locking-out. Such hoist shall not be utilized until the defect(s) have been corrected by a qualified person. Any hoist that has not been used for one year or more shall receive a “periodic” inspection prior to use.

**4.2 Periodic Inspections.** Periodic inspections may be performed monthly to annually depending on specific guidance contained within the lifting hoist service manual. Exhibit W1-2 contains a list of items generally included in a periodic inspection, but the specific list for each hoist must come from the lifting hoist service manual. Any defect(s) which may affect safe operation of the hoist shall result in the hoist being immediately taken out of service by means of tagging and locking-out. Such hoist shall not be utilized until the defect(s) have been corrected by a qualified person.

**4.3 Labeling of Trolley Beams.** All trolley beams to be utilized as part of an overhead trolley hoist system are required to be load rated with signage conspicuously posted indicating the maximum load that may be safely hoisted. Newly installed or unlabelled beams require external evaluation and certification by a registered professional engineer or internal evaluation by loading the system according to Exhibit W1-4 and inspecting for deformation or other signs of impending failure.

**4.4 Inspection Records.** Pre-use inspection records in which a defect(s) has been found shall be maintained until such defect(s) is corrected. Periodic inspection records shall be maintained for a period of 1 calendar year or until the next periodic inspection has been performed.

**5.0 Mobile Crane Inspections.** Inspection of mobile cranes and components are in two categories; pre-use and periodic.

**5.1** Crane inspections will be conducted by an employee or third party who is deemed qualified or competent to inspect a specific type of crane.

**5.2 Pre-use inspections.** Pre-use inspections occur each day prior to the mobile crane being utilized. An inspection is not required on a day in which the mobile crane is not utilized. An overall inspection checklist has been provided as Exhibit W1-5.

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**5.3 Periodic Inspections.** Supervisors will determine and schedule additional inspections periodically during crane use, where service conditions warrant. A thorough periodic inspection shall be made on a regular basis, to be determined based on: frequency of crane use; severity of service conditions; nature of lifts being made; experience gained on the service life of cranes used in similar circumstances; and as a minimum the following schedule:

Class	Description	Schedule
A	Standby or infrequent service	Annually
B	Light service (2.5 lifts/hour)	Annually
C	Moderate Service (50% capacity, 5-10 lifts/hour)	Annually
D	Heavy Service (50% capacity, 11—20 lifts/hour)	Semi-annually
E	Severe Service (near capacity, 20+ lifts/hour)	Quarterly
F	Continuous Severe Service (near capacity, continuous service throughout the day)	Bi-monthly

**5.4 Inspection Records.** Pre-use inspection records in which a defect(s) has been found shall be maintained until such defect(s) is corrected. Periodic inspection records shall be maintained for a period of 1 calendar year or until the next periodic inspection has been performed.

**6.0 Lifting Device Safety Requirements.** The following safety requirements apply to all lifting devices.

- 6.1** Only trained and competent operators shall operate cranes, hoists or lifting devices.
- 6.2** Only trained and competent persons shall rig loads to be lifted using standard rigging practices (ASME B30.9).
- 6.3** The load limit for the lifting device must be posted and easily visible to operating personnel.
- 6.4** The load limit for the lifting device must not be exceeded.
- 6.5** The lifting device must be in good working order and function properly.
- 6.6** The lifting device, if portable, must be:
  - 6.6.1 Anchored securely; and
  - 6.6.2 Secured to an anchor point (e.g. beam) that is load rated to at least the same rate as the lifting device.
- 6.7** Electric hoists must be equipped with functioning upper limit switches to prevent over travel.
- 6.8** Estimating the Weight of Loads
  - 6.8.1 Lifting will not be conducted until load weights have been determined. When estimating load weights operators will stay within 50% of the crane/hoists rated capacity when estimating loads, or within manufacturer recommendations.
  - 6.8.2 The following methods may be used to estimate the weight of loads:
    - 6.8.2.1 Check equipment nomenclature plates
    - 6.8.2.2 Check shipping papers
    - 6.8.2.3 Consult with the equipment manufacturer
    - 6.8.2.4 Estimate weight using weights or similar loads
    - 6.8.2.5 Use a dynamometer
    - 6.8.2.6 Use industry standard tables or charts

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- 6.9** All personnel must stay well clear of the load being lifted to prevent injury if the load should release unexpectedly.
- 6.10** Any accessible area within the swing radius of any fixed or mobile crane/hoist shall be barricaded to prevent access.
- 6.11** If the lifting device operator is unable to see the load as well as the lifting mechanism, a spotter/signaler must be present.
  - 6.11.1 Spotters/signalers must be trained in proper hand and/or radio signals, be tested in their use, and review their use prior to applications where they are required.
  - 6.11.2 Only one designated and trained spotter/signaler shall give hand signals to the hoist operator, except in the case of “emergency stop “which can be given by anyone.
  - 6.11.3 Every signal must be acknowledged by the operator.
  - 6.11.4 Operation must be stopped any time communication between the operator and spotter/signaler is lost.
- 6.12** The load being lifted must be adequately secured to the lifting device using acceptable rigging practices.
- 6.13** Taglines shall be attached to loads that may require steadying or guidance while suspended. Personnel shall not “hold onto” suspended loads for steadying or guiding the load.
- 6.14** No mobile cranes shall be operated closer than 10 feet (3 meters) of live overhead power lines.
- 6.15** Mobile cranes shall not be operated without the use of outriggers, or without the full amount of counterweight as specified by the manufacturer.

**7.0 Sling, Cable and Chain Safety Requirements.** The following safety requirements apply to the use of slings, cables and chains:

**7.1 General Safe Operating Practices**

- 7.1.1 Never exceed the working load limit of the sling, cable or chain. The working load for a given sling varies depending on the configuration of the sling on the item being lifted – see the example contained within Exhibit W1-3.
- 7.1.2 Do not shock load the sling, cable or chain.
- 7.1.3 Protect slings, cables and chains from sharp corners and objects.
- 7.1.4 Chains for lifting shall be of Grade 80 or higher. When purchasing a chain, a tag indicating the grade should be attached to it. This tag, or a record of it, should be maintained with plant equipment records.
- 7.1.5 All hooks originally equipped with safety catches will be so equipped.
- 7.1.6 Use only alloy chain and components.
- 7.1.7 Do not use twisted, knotted, or kinked slings, cables or chains.
- 7.1.8 Do not drop loads on slings, cables or chains or attempt to pull rigging from under a load resting on it.
- 7.1.9 Balance all loads appropriately.
- 7.1.10 Before being lifted completely from its resting position, loads will be checked for proper balance and slippage of rigging.
- 7.1.11 Rigging and slings shall be properly stored in designated areas to protect against damage (e.g. corrosion, chemical burns, weld burns, etc.) and free from creating a hazard.
- 7.1.12 Additional sling safety reference materials have been prepared in Exhibit W1-7.

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**7.2 Rigging Identification.** Slings, cables and chains having identification numbers and/or load limit ratings will be checked for legibility. Items having illegible identification will be removed from service immediately for disposal or load testing and remarking.

**7.3 Inspections.** Inspection of rigging equipment are in two categories; pre-use and periodic.

**7.3.1 Pre-Use Inspections.** Pre-Use Inspections must be completed for all slings, cables, chains, and all fastenings by qualified operating or maintenance personnel prior to each use. A documented inspection record is not required.

**7.3.2 Periodic Inspections.**

7.3.2.1 Shall be made on a regular basis to be determined based on: frequency of use; severity of service conditions; nature of lifts being made; and experience gained on the service life of rigging equipment used in similar circumstances.

7.3.2.2 Shall in no event be at intervals greater than once every 12 months.

7.3.2.3 Shall be recorded using Exhibit W1-6.

## **8.0 Lifting Hoist Accessories**

**8.1** Lifting hoist accessories such as material baskets, cages, buckets, gas cylinder holders, and drum holders must be designed for such purpose and load rated indicating the maximum load that they may safely carry.

**8.2** Homemade (i.e. plant or contractor constructed) accessories intended for lifting or hoisting of materials are permissible, but only after review and approval by a licensed engineer.

**8.3** If personnel are to be hoisted by means of a mobile crane (i.e. certified man basket), procedures for personnel hoisting found in ANSI B30.23 shall be followed, including, but not limited to:

8.3.1 Only personnel hoisting baskets manufactured in accordance with ANSI standards shall be used. Rigging used for personnel hoisting shall be designated for personnel hoisting only.

8.3.2 The designated rigging shall not be used for other purpose.

8.3.3 The crane used to hoist the personnel shall:

8.3.3.1 Be equipped with an anti-two block device that stops the upward hoist immediately.

8.3.3.2 Not be capable of freefall.

8.3.3.3 Be de-rated to 50% of its rated capacity for the personnel hoist.

8.3.4 A test lift must be conducted prior to the lift and after each crane movement and setup.

8.3.5 A pre-lift safety briefing must be conducted with all affected personnel.

8.3.6 Personnel being hoisted shall exercise 100% tie off using full body harness and lanyard unless being hoisted or working over water.

8.3.7 If being hoisted or working over water, personnel shall wear life jackets according to Policy F1: Personal Protective Equipment.

8.3.8 Lifts involving hoisting of personnel must have prior approval from the Regional Manager.

## **9.0 Training**

**9.1** Only individuals trained, and who demonstrate proficiency in the inspection and use of hoisting and rigging practices, shall be permitted to operate hoists.

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- 9.2** Training must be documented for:
  - 9.2.1 Initial training
  - 9.2.2 Task training for use of a newly acquired lifting hoist
  - 9.2.3 Annual refresher training for those individuals regularly using hoists.
- 9.3** Training may be provided via internal or external resources, however, regardless of the training resource utilized, the following subjects shall be part of the training:
  - 9.3.1 Operating characteristics of the lifting hoist to include capabilities and limitations
  - 9.3.2 The meaning of warning labels affixed to the hoist
  - 9.3.3 Familiarity with the owner’s manual
  - 9.3.4 Safe work practices such as
    - 9.3.4.1 Visual contact with load and device
    - 9.3.4.2 Keeping the operator and others out of harm’s way of a load
    - 9.3.4.3 Safe rigging and handling of loads
  - 9.3.5 Items of inspection and appropriate follow-through for defects found
  - 9.3.6 A demonstration to the trainer, using each hoist to be used by the trainee, as to proper hoist operation and record keeping.
- 9.4** Personnel training records will be maintained for the duration of employment for each individual so trained.

**10.0 Contractors**

- 10.1** All contractors using cranes, hoists or other lifting devices on site must comply with Hoisting and Rigging Program and shall be approved for such work through Contractor Management Program.
- 10.2** All contractors working areas where cranes, hoists or other lifting devices may operate must be informed of potential hazards.