

OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION
DEPARTMENT OF CONSUMER AND BUSINESS SERVICES

PROGRAM DIRECTIVE

Program Directive A-232
Issued March 17, 1999
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- SUBJECT:** Fall Protection: Communication Tower Construction Activities
- REFERENCES:** Construction Safety and Health Standards, 29 CFR 1926.550 and Subpart M.
- American National Standard, ANSI - B30.7, Base Mounted Drum Hoist
- Michigan Department of Consumer and Industry Services (MIOSHA) interim order from rule R408.4113(1), Rule 1113(1).
- National Association of Tower Erectors (NATE) Guidelines for the Radio, Television, Communications Tower Industry.
- ANSI/TIA/EIA-222-F-1996, Structural Standard for Steel Antenna Towers and Antenna Supporting Structures.
- Federal OSHA Instruction CPL 2-1.36.
- PURPOSE:** This instruction establishes the inspection policy and procedures to ensure uniform enforcement of the provisions addressing fall protection and safe access to communications towers during construction and describes best practices for use by the industry.
- SCOPE:** This instruction applies OR-OSHA-wide.
- APPLICATION:** This instruction applies only to the construction of new communications towers. Activities such as maintenance, retrofitting, and dismantling are not covered by this directive.
- ACTION:** Field Office Managers will ensure that compliance officers are familiar with the contents of this instruction and that the enforcement guidelines are followed.
- BACKGROUND:** Accessing towers by the use of fixed ladders with attached climbing

devices has been the preferred method as it provides conventional fall protection during ascent and descent of the structure. Some representatives of the tower construction industry assert that continual climbing of high towers is physically demanding and can lead to stress and medical ailments over an extended period of time and may contribute to other safety problems including falls. To alleviate these problems, the industry has asked that employees be allowed to ride a hoist line to work stations on towers. Since OR-OSHA does not specifically address tower erection under its current standards but wishes to help reduce the accident and injury rates associated with tower erection, OR-OSHA believes that the methods in Appendix A represent the best practices which can be implemented to safeguard employees while being hoisted to work stations on the tower. If new information shows that these practices need to be changed, OR-OSHA will revise this directive accordingly.

Compliance Guidelines for Fall Protection and Employee Access by Hoist During Communication Tower Construction Activities.

1. For purposes of this directive, OR-OSHA agrees that the hoist line may be used to hoist employees for access to tower work stations if the work practices and requirements set out in Appendix A are followed.

When climbing the tower during construction activities, employees must be protected from falls using a fall arrest system meeting the criteria of 1926.502 or a ladder assist safety device meeting the requirements of 1926.1053(a). These are also acceptable methods of accessing tower work stations. All employees climbing or otherwise accessing towers must be trained in the recognition and avoidance of fall hazards and in the use of the fall protection systems to be used, pursuant to 1926.21 or where applicable, 1926.1060.

2. Current OR-OSHA standard 437-003-1501 requires fall protection at heights of more than 10 feet.

CITATION GUIDELINES:

1. For hazards associated with falls once employees are at their workstation at levels in excess of 10 feet, employers who fail to provide fall protection will be cited under 437-003-1501.
2. Whenever an employer fails to follow the guidelines set forth in Appendix A, citations will be issued under the applicable provisions of subpart N and, in the alternative, ORS 654.010 (the general duty clause) for hazards associated with work practices and equipment used to hoist employees on load lines to gain access to towers.

APPENDIX A

Compliance Guidelines for Employee Access by Hoist During Communication Tower Construction Activities

Definitions

Crew Chief: One who is authorized, designated, deemed competent and qualified by the employer.

Anti-Two Blocking: A positive acting device which prevents contact between the load block or overhaul ball and the top block (two-blocking), or a system which deactivates the hoisting action before damage occurs in the event of a two-block situation.

Maximum Intended Load: The total load of all employees, tools, materials, load lines and other loads reasonably anticipated to be applied to the hoist apparatus when an employee is hoisted.

Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate problems.

Authorized Person: A person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the job site.

Qualified: One who, by possession of a recognized degree, certificate or 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, the work or the project.

Gin Pole: A device attached to the tower used to raise sections of tower steel or equipment into position.

Specific Requirements. Employees may be hoisted on the hoist line to reach work stations only if all of the following conditions are met. The Agency believes that strict adherence to the guidelines set forth in this Appendix will provide employers with the appropriate safety measures for access during tower erection.

1. Training. Before an employee is allowed to perform any job related to hoisting employees aloft for tower work, the employee shall receive training on safe access pursuant to these guidelines. The operator of the hoist shall have a thorough understanding of these guidelines pertaining to hoisting employees on the hoist line.

2. Equipment.

- a. An anti-two block device shall be used on all hoists, except where an employer can demonstrate that ambient radiation frequency (RF) precludes that use. In such cases, a site specific program will be established and maintained on site to ensure that two blocking cannot occur and that effective communication between the hoist operator and personnel being hoisted is maintained. This program could include a cable marking system, an employee situated on the tower in a position to observe the top block, or any other system which will adequately ensure communication.
- b. The rigging, hoist line and slings shall have a factor of safety of 10 against failure during personnel lift(s).
- c. The hoist line used to raise or lower employees shall be equipped with a swivel to prevent any rotation of the employees.
- d. The use of spin-resistant wire rope is prohibited when hoisting employees.
- e. When hoisting personnel (versus material) the hoist capacity load rating shall be derated by a factor of 2 (reduced by half).
- f. All employees shall be provided with and required to use the proper personal protective equipment (including fall protection equipment) which shall be inspected before each lift.
- g. Except where the employer can demonstrate that specific circumstances or conditions preclude its use, a guide line (tag line) shall be used to prevent the employees or the platform from contacting the tower during hoisting.
- h. The gin pole shall be thoroughly inspected before use by a competent person to determine that it is free from defects, including but not limited to: damaged and/or missing members; corrosive damage; missing fasteners and broken welds at joints; and general deterioration.
- i. The gin pole shall be attached to the tower as designed by a registered professional engineer. There shall be a minimum of two attachment locations: at the bottom of the gin pole and near the top of the tower being erected.
- j. The personnel load capacity and material capacity of the lifting system in use shall be posted at the site near the location of the hoist operator. If the system is changed (for example, if the gin pole angle is changed), the posted capacity shall be changed accordingly.

3. Trial Lift and Proof Testing.

- a. A trial lift of the maximum intended personnel load shall be made from ground level to the location to which personnel are to be hoisted.
- b. The trial lift shall be made immediately prior to placing personnel on the hoist line. The hoist operator shall determine that all systems, controls and safety devices are activated and functioning properly. A single trial lift may be performed for all locations that are to be reached from a single set-up position. The hoist operator shall determine that no interference exists and that all configurations necessary to reach those work locations remain under the limit of the hoist's rated capacity as identified in paragraph 2(e), and additionally maintain a 10:1 factor of safety against failure.
- c. The trial lift shall be repeated prior to hoisting employees whenever the hoist is moved and set up in a new location or returned to a previously used position.
- d. After the trial lift, employees shall not be lifted unless the following conditions are met:
 - (1) Hoist wire ropes are determined to be free of damage in accordance with the provisions of 29 CFR 1926.550;
 - (2) Multiple part lines are not twisted around each other; and,
 - (3) The proof testing requirements have been satisfied.
- e. If the hoist wire rope is slack, the hoisting system shall be inspected to ensure that all wire ropes are properly seated on drums and in sheaves.
- f. A visual inspection of the hoist, rigging, base support and foundation shall be made by a competent person immediately after the trial lift to determine whether testing has exposed any defect or adverse effect upon any component of the structure.
- g. Any defects found during the inspection which may create a safety hazard shall be corrected, and another trial lift shall be performed before hoisting personnel.
- h. Prior to hoisting employees and after any repair or modification, the personnel rigging shall be proof tested to 125% of the greatest anticipated load by holding it in a suspended position for five minutes with the test load evenly distributed (this may be done concurrently with the trial lift). After proof testing, a competent person shall inspect the rigging. Any deficiencies found shall be corrected and another proof test shall be

conducted.

4. Pre-Lift Meeting.

- a. A pre-lift meeting shall be held prior to the trial lift at each location.
- b. The pre-lift meeting shall:
 - (1) be attended by the hoist operator, employees to be lifted, and the crew chief;
 - (2) review the procedures to be followed and all appropriate requirements contained in this guideline; and
 - (3) be repeated for any employee newly assigned to the operation.

5. Documentation.

- a. All trial lifts, inspections and proof tests shall be documented, and the documentation shall remain on site during the entire length of the project.
- b. The pre-lift meeting shall be documented, and the documentation shall remain on site during the entire length of the project.

6. Hoisting an Employee to the Work Station.

- a. Except where an employer can demonstrate that specific circumstances or conditions preclude its use, a personnel platform must be used to hoist more than one employee to the work station. That personnel platform must meet the requirements of 29 CFR 1926.550 (g). When a personnel platform cannot be used, the provisions in paragraph b below must be followed.
- b. When a boatswains seat-type or full body seat harness is used to hoist employees, the following shall apply:
 - (1) No more than two employees may be hoisted at a time;
 - (2) The employee's harness shall be attached to the hook by a lanyard meeting the strength requirements of 29 CFR 1926.502;
 - (3) Only locking-type snap hooks shall be used; and
 - (4) The harness shall be equipped with two side rings and at least one front and one back D ring.
- c. The hoist line hook shall be equipped with a safety latch which can be

locked in a closed position to prevent loss of contact.

- d. The maximum rate of travel shall not exceed 200 feet per minute when a guide line is used to control personnel hoists. When a guide line cannot be used, the rate of travel of the employee being hoisted shall not exceed 100 feet per minute. In all personnel hoist situations, the maximum rate shall not exceed 50 feet per minute when personnel being lifted approach to within 50 feet of the top block.
- e. The use of free-spooling (friction lowering) is prohibited.
- f. When the hoist line is being used to raise or lower employee(s), there shall be no other load attached to any hoist line, and no other load shall be raised or lowered at the same time on the same hoist.
- g. As-built drawings approved by a registered professional engineer shall provide the lifting capacity of the gin pole and shall be available at the job site.
- h. The gin pole raising line shall not be used to raise or lower employees.
- i. Employees must maintain 100% tie-off while moving between the hoist line and the tower.

7. Communication Between the Hoist Operator and Hoisted Employees.

- a. Employees being hoisted shall remain in continuous sight of and/or in direct communication with the operator or signal person. In those situations where direct visual contact with the operator is not possible and the use of a signal person would create a greater hazard for the person being hoisted, direct communication alone, such as by radio, shall be used.
- b. When radios are used, they shall be non-trunking closed 2-way selective frequency radio systems.
- c. When hand signals are used, the employees must use industry standardized hand signals as required by 1926.550(a)(4).

8. Weather Conditions/Energized Power Lines.

- a. Employees shall not be hoisted during adverse weather conditions (high winds, electrical storms, snow, ice, sleet), or other impending danger, except in the case of emergency employee rescue. This determination shall be made by the competent person.
- b. The hoist system (gin pole and its base hoists) used to raise and lower employees on the hoist line, shall not be used unless the following

clearance distances as recommended by ANSI are maintained at all times during the lift:

| Power line voltage phase to phase (kV) | Minimum safe clearance (feet) |
|---|--------------------------------------|
| 50 or below | 10 |
| Above 50 to 200 | 15 |
| Above 200 to 350 | 20 |
| Above 350 to 500 | 25 |
| Above 500 to 750 | 35 |
| Above 750 to 1,000 | 45 |

9. Hydraulic Hoists (Drum Hoists).

- a. The hoist used for personnel lifting shall meet the applicable requirements for design, construction, installation, testing, inspection, maintenance, modification, repair and operations as referenced in this Appendix and as prescribed by the manufacturer. Where manufacturers' specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a registered professional engineer.
- b. The hoist shall be positioned so that it is level and the distance between the drum and the foot block at the base of the tower will allow proper spooling of wire rope.
- c. The foot block shall be anchored to prevent displacement and be supported to maintain proper alignment.
- d. The hoist shall be designed to lift materials and personnel with the same drum or drums.
- e. Any hoist that has been modified or repaired must be proof-tested to 125% of its rated capacity.
- f. Rated load capacities, recommended operating speeds, and special hazard warnings or instructions shall be conspicuously posted on all hoists.
- g. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains or other rotating parts, where exposed, shall be totally enclosed.
- h. Personnel load capacity for the current configuration of the gin pole shall be posted within sight of the hoist operator.

- i. The hoist shall have an hour meter and a line speed limiter.
- j. The hoist shall be designed for and must use powered lowering.
- k. The alignment of hoist components shall be maintained within manufacturer's specified limits that prevent premature deterioration of gear teeth, bearings, splines, bushings, and any other parts of the hoist mechanism.
- l. All exhaust pipes shall be guarded where exposed.
- m. An accessible fire extinguisher of 5BC rating or higher shall be available at the operator's station.
- n. The hoist shall be serviced and maintained per the manufacturer's recommendations.
- o. The operating manual developed by the manufacturer for the specific make and model hoist being used shall be maintained at the site at all times.
- p. A hoist log book shall be used to record all hoist inspections, tests, maintenance and repair. The log shall be updated daily as the hoist is being used and shall be signed by the operator and/or crew chief. Service mechanics shall sign the log after conducting maintenance and repair. The log shall be maintained at the site.

10. Hoist Mounting.

- a. The hoist shall be installed following the manufacturer's mounting procedure to prevent excessive distortion of the hoist base as it is attached to the mounting surface. Flatness of the mounting surface shall be held to tolerances specified by the hoist manufacturer.
- b. The hoist shall be anchored so as to resist at least two times any reaction induced at the maximum attainable line pull and shall be anchored so that the hoist will not twist or turn.
- c. If the hoist is mounted to a truck chassis, it shall be properly aligned and anchored in at least two corners to prevent movement, and the wheels shall be properly chocked.

11. Drums.

- a. The hoist drum shall be capable of raising or lowering 125% of the rated load of the hoist.

- b. The hoist drum shall have a positive means of attaching the wire rope to the drum.
- c. There shall always be at least three full wraps of wire rope on the hoist drum when personnel are being hoisted.
- d. During operation, the flange shall be two times the wire rope diameter higher than the top layer of wire rope at all times.

12. Brakes and Clutches.

- a. Brakes and clutches shall be capable of arresting any over-speed descent of the load.
- b. The hoist shall be provided with a primary brake and at least one independent secondary brake, each capable of stopping and holding 125% of the lifting capacity of the hoist.
- c. The primary brake shall be directly connected to the drive train of the hoisting machine, and shall not be connected through belts, chains, clutches or screw-type devices.
- d. The secondary brake shall be an automatic emergency-type brake that, if actuated during each stopping cycle, shall not engage before the hoist is stopped by the primary brake.
- e. When a secondary brake is actuated, it shall stop and hold the load within a vertical distance of 24 inches.
- f. Brakes and clutches shall be adjusted, where necessary, to compensate for wear and to maintain adequate force on springs where used.
- g. Powered lowering must be used.
- h. When power brakes having no continuous mechanical linkage between the actuating and braking mechanism are used for controlling loads, an automatic means shall be provided to set the brake to prevent the load from falling in the event of loss of brake actuating power.
- i. Static brakes shall be provided to prevent the drum from rotating in the lowering direction and shall be capable of holding the rated load indefinitely without attention from the operator.
- j. Brakes shall be automatically applied upon return of the control lever to its center (neutral) position.

- k. Brakes applied on stopped hoist drums shall have sufficient impact capacity to hold 1.5 times the rated torque of the hoist.

13. Hoist Controls.

- a. Power plant controls shall be within easy reach of the operator and shall include a means to start and stop, control speed of internal combustion engines, stop prime mover under emergency conditions, and shift selective transmissions.
- b. All controls used during the normal operation of the hoist shall be located within easy reach of the operator at the operator's station.
- c. Controls shall be clearly marked (or be part of a control arrangement diagram) and easily visible from the operator's station.
- d. Foot-operated pedals, where provided, shall be constructed and maintained so the operator's feet will not readily slip off and the force necessary to move the pedals can be easily applied.
- e. The controls shall be self-centering controls (i.e., "deadman" type) that will return the machine to neutral and engage the drum brakes if the control lever is released.

14. Wire Rope and Rigging

- a. All wire rope and rigging shall be inspected daily before use.
- b. All eyes in wire rope slings shall be fabricated with thimbles.
- c. All eyes in wire rope slings shall:
 - (1) Be made with swaged-type fittings; and,
 - (2) Be field fabricated by a qualified person or factory made.

15. Hoist Operator.

- a. The hoist operator shall have classroom training, a minimum of 40 hours experience as a hoist operator, not less than 8 hours experience in the operation of the specified hoist or one of the same type, and demonstrated the ability to safely operate the hoist.

- b. The employer shall not allow an employee to operate a hoist when that employee is physically or mentally unfit.
- c. The hoist operator shall be responsible for those operations under his/her direct control. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle the load until safety has been assured.
- d. The hoist operator shall remain at the controls at all times when personnel are on the hoist line.
- e. Before starting the hoist, the operator shall ensure that:
 - (1) The daily inspection has been conducted;
 - (2) All controls are in the "off" position; and,
 - (3) All personnel are in the clear.

16. Hoist Inspections.

- a. Routine inspections.
 - (1) Each day before use all hoists shall be visually inspected by a qualified person.
 - (2) All hoists shall be inspected thoroughly at three month intervals by a qualified person, as will any hoists that have been idle for more than one month but less than six months. Such inspection will include a hands-on operation of all moving parts to ensure that they are intact and will properly function before being put into service.
- b. All hoists shall undergo a tear-down inspection annually unless the following conditions exist that allow for less frequent tear-down inspections.
 - (1) A hoist that has been idle for a period of over six (6) months shall be given an annual inspection which includes the hoist being completely disassembled, cleaned and inspected. Parts such as pins, bearings, shafts, gears, brake plates, etc. found worn, cracked, corroded, distorted or otherwise non-functional must be replaced before the hoist is used.
 - (2) Hoists with infrequent to moderate usage (hoists that have been used for fifty (50) hours or less per month and normally operate at considerably less than the hoist rated capacity based on the average use over a month) may go up to thirty-six (36) months between tear down inspections if serviced under a preventive maintenance

program (as specified by the manufacturer) that includes annual hydraulic oil sample analysis. An oil sample analysis, meaning a laboratory analysis, is used to evaluate the mechanical integrity of the hoist. Oil in these hoists shall be changed at least on an annual basis, just after the oil analysis is performed. Hoists not subjected to recommended oil sample analysis shall undergo an annual tear-down inspection.

- (3) Hoists that experience heavy usage (hoists that are used for more than fifty (50) hours per month) may go up to twenty-four (24) months between tear-down inspections if serviced under a preventive maintenance program as in (2) above.
- (4) Any rebuilt hoist assembly must be line pull tested to the rated load. The hoist drum must be rotated several times in both raising and lowering directions under full-rated load, while checking for smooth operation.