

**North Carolina Department of Labor
Occupational Safety and Health Division**

Raleigh, North Carolina

Field Information System

CPL 02-01-056

Subject: Inspection Procedures for Accessing Communication Towers by Hoist

A. **Scope.**

This directive describes OSHA's inspection policy for uniform enforcement of standards addressing fall protection and safe access to communications towers when using a personnel hoist to take employees to or from workstations.

B. **Discussion.**

On January 15, 1999, OSHA issued CPL 2-1.29 - *Interim Inspection Procedures during Communication Towers Construction Activities*. This CPL described OSHA's inspection policy and procedures to ensure uniform enforcement by field enforcement personnel of the provisions addressing fall protection and safe access to communication towers during construction. The North Carolina Department of Labor, Occupational Safety and Health (OSH) Division enforced this directive.

On March 26, 2002, OSHA issued CPL 2-1.36 - *Interim Inspection Procedures during Communication Towers Construction Activities*. This CPL left most of the original directive unchanged but removed the restriction on hoisting personnel on the hoist line to their workstation if the workstation was lower than 200 feet. The OSH Division did not enforce CPL 2-1.36 at the time it was issued pending development of the state-specific communication towers rule. Between 2005 and 2007, North Carolina established state-specific rules titled *Communication Tower Standards* at 13 NCAC 7F.0600 and subsequently reviewed and enforced the 2002 directive with some revisions.

On July 14, 2014, OSHA issued this current CPL, which leaves the 2002 directive largely unchanged but covers all hoisting of personnel to or from workstations on communication towers. The previous directive only addressed the hoisting of personnel during new tower construction.

The OSH Division has reviewed this directive and will enforce it with revisions to the following paragraphs:

- **Paragraph IX - Compliance Guidelines (page 7, note):** The OSH Division will follow the requirements established by 13 NCAC 7F.0600 – Communication Tower Standards.

- Paragraph X - Citation Guidelines (page 8, 2nd paragraph): The OSH Division will allow employees to access a tower via hoist as outlined in CPL 02-01-056 Appendix A, “Compliance Guidelines for Employee Access by Hoist during Communication Tower Construction Activities.” However, the employer must also comply with any applicable North Carolina specific tower rules such as: 13 NCAC 7F.0600 – Communication Tower Standards.
- Paragraph X - Citation Guidelines (page 8, note): The OSH Division will follow the requirements established by 13 NCAC 7F.0600 – Communication Tower Standards.

C. **Action.**

OSH Division personnel will conduct inspections, surveys, assistance, and training in accordance with the guidance contained in paragraph B above and CPL 02-01-056. Additionally, OPN 122 (most current revision) supplements this guidance. These two documents combine to establish policy in North Carolina, and neither will be applied independently of the other.

D. **Effective Date.**

CPL 2-1.36 is canceled. This CPL is effective on the date of signature. It will remain in effect until revised or canceled by the director.

Signed on Original
Edward E. Lewis
Safety Standards Officer

Signed on Original
Allen McNeely
Director

11/12/2014
Date of Signature



OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR

Occupational Safety and Health Administration

DIRECTIVE NUMBER: CPL 02-01-056

EFFECTIVE DATE: 07/17/2014

SUBJECT: Inspection Procedures for Accessing Communication Towers by Hoist

ABSTRACT

- Purpose:** This directive provides general enforcement guidance and procedures for use by field personnel during inspections involving hazards associated with using a hoist to take employees to or from workstations on communication towers. This directive applies to all work activities on communication towers that involve the use of a personnel hoist.
- Scope:** OSHA-wide.
- References:** See paragraph III.
- Cancellations:** This instruction cancels the instruction contained in CPL 02-01-36 (March 26, 2002), Interim Inspection Procedures During Communication Tower Construction Activities.
- State Plan Impact:** Federal Program Change, Notice of Intent and Equivalency Required. See Section VI.
- Action Offices:** National, Regional, and Area Offices.
- Originating Office:** Directorate of Construction

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By and Under the Authority of

David Michaels
Assistant Secretary of Labor for Occupational Safety and Health

Executive Summary

This instruction provides general enforcement guidance and procedures for use by compliance officers during inspections involving hazards associated with using a hoist to take employees to or from workstations on communication towers. This directive applies to all work activities on communication towers that involve the use of a personnel hoist.

Significant Changes

This directive replaces CPL 02-01-36, dated March 26, 2002. The previous directive provided compliance guidance for hoisting personnel to or from their workstations during new tower erection only. This directive covers all hoisting of personnel to or from workstations on communication towers.

Table of Contents

I.	Purpose	5
II.	Scope	5
III.	References	5
IV.	Cancellations	6
V.	Action Offices	6
	A. Responsible Office	6
	B. Action Office	6
VI.	State Plan Impact	6
VII.	Significant Changes	6
VIII.	Background	7
IX.	Compliance Guidelines	7
X.	Citation Guidelines	7
	Appendix A - Compliance Guidelines for Employee Access by Hoist During Communications Tower Work Activities	I-XII

I. Purpose.

This directive covers any work on a communication tower that involves the use of a hoist to lift personnel to or from their workstations. This instruction provides guidance to field enforcement personnel to ensure uniform enforcement of OSHA standards and policies.

II. Scope.

This instruction applies OSHA-wide.

III. References.

- A. 29 CFR Part 1926 – Safety and Health Regulations for Construction, Subpart E (Personal Protective and Life Saving Equipment), Subpart M (Fall Protection), and 29 CFR 1926.1431 (Hoisting personnel)
- B. American National Standards Institute, ANSI/ASME - B30.7-2011, Winches (formerly titled, “Base Mounted Drum Hoists”)
- C. ANSI/ASME B30.23 - 2011, Personnel Lifting Systems
- D. ANSI/ASSE A10.22-2007, Safety Requirements for Rope-Guided and Non-Guided Workers’ Hoists
- E. Michigan Occupational Safety and Health Administration (MIOSHA), R408.42901 - 408.42943, Communication Towers
- F. National Association of Tower Erectors (NATE) Guidelines for the Radio, Television and Communications Tower Industry
- G. ANSI/TIA-222-G-2009, Structural Standard for Antenna Supporting Structures and Antennas
- H. Occupational Safety and Health Act of 1970, Section 5(a)(1)
- I. North Carolina Department of Labor, Communication Tower Standards - 13 NCAC 07F .0600
- J. 29 CFR 1926.552, Material Hoists, Personnel Hoists, and Elevators
- K. 29 CFR 1926.553, Base-mounted Drum Hoists

IV. Cancellations.

This instruction cancels the instruction contained in CPL 02-01-36, Interim Inspection Procedures During Communication Tower Construction Activities.

V. Action Offices.

A. Responsible Office.

Directorate of Construction

B. Action Offices.

National, Regional and Area Offices.

VI. State Plan Impact.

- A. This instruction describes a modification to a previously issued Federal Program Change and provides enforcement guidance and procedures for hazards associated with any work activities on communication towers that involve the use of a personnel hoist. State Plans must have standards, enforcement policies, and procedures that are at least as effective as those of federal OSHA. State Plans have the option of adopting identical or different, but at least as effective, enforcement policies as those contained in this directive.
- B. Within 60 days of the date of issuance of this directive, State Plans must submit a notice of intent indicating if the State Plan will adopt or already has in place enforcement guidance and procedures that are identical to or different from this directive. State adoption, either identical or different, should be accomplished within 6 months. If adopting identically, the State Plan must provide the date of adoption to OSHA, due within 60 days of adoption. If the State Plan adopts or maintains enforcement policies that differ from this directive, the State Plan must either post its different policies on its State Plan website and provide a link to OSHA, or provide OSHA with an electronic copy and the name and contact information of someone within the State Plan who can assist the public with obtaining a copy. This action must occur within 60 days of the date of adoption. OSHA will post summary information of the State Plan responses to this directive on its website.

VII. Significant Changes.

OSHA's enforcement policy in CPL 02-01-36 addressed the hoisting of personnel to workstations during new tower erection activities only. This revision of the Agency's enforcement policy covers any work on a communication tower that involves the use of a hoist to lift personnel to or from the workstation.

VIII. Background.

The preferred method for accessing workstations on communication towers is to use fixed ladders with attached climbing devices, as this method provides conventional fall protection during ascent and descent of the structure. However, when employees are going to be climbing the tower repeatedly, and materials must be hoisted, industry practice is to hoist employees to the work level on the tower.

IX. Compliance Guidelines.

- A. All compliance personnel shall be vigilant when encountering communication tower worksites. Any compliance officer who finds a communication tower work site shall record the identifying details of the work activity, if known, and shall contact the Area Office Supervisor to determine whether to conduct an inspection.

- B. OSHA's standards for cranes and derricks in construction (29 CFR Part 1926, Subpart CC) generally apply to "power-operated equipment . . . that can hoist, lower, and horizontally move a suspended load." 29 CFR 1926.1400(a). The hoist systems currently used during communication tower work activities are capable of powered raising and lowering, but are not typically capable of powered horizontal movement. Without this capability, they are not covered by Subpart CC. Hoist systems not covered under Subpart CC may be used to hoist employees for access to or departure from the work position on the tower under the conditions set out below in this directive and the accompanying Appendix. However, for work done with any power-operated equipment that *can* hoist, lower and horizontally move a suspended load, the employer must comply with Subpart CC, including 29 CFR 1926.1431 (Hoisting personnel), as applicable. (Pursuant to 29 CFR 1926.1400(c)(12), Subpart CC *does not apply to gin poles* used for the erection of communication towers.)

[Note: Accessing towers without a hoist. Regardless of height or activity, it is acceptable for employees to climb or descend the tower using a fall arrest system meeting the criteria of 29 CFR 1926.502(d) or a ladder assist safety device meeting the requirements of 29 CFR 1926.1053(a)(22) and (23). All employees exposed to fall hazards in construction work need training in the recognition and avoidance of fall hazards and in the use of any fall protection systems to be used, pursuant to, as applicable, 29 CFR 1926.21(b)(2), 29 CFR 1926.503, or 29 CFR 1926.1060.]

X. Citation Guidelines.

This directive covers work activities involving personnel being hoisted to or from a workstation on a communication tower. Work that uses a hoist to lift personnel to and from the workstation is likely to be of sufficient magnitude and difficulty to be

considered construction, and should be coded and cited as such.¹ Furthermore, any investigation of a communication tower work site shall be coded in OIS using the **COMTOWER** designation.

If an employer fails to follow the guidelines set forth in Appendix A when employees are hoisted to or from workstations on communication towers, compliance officers should consider a citation under Section 5(a)(1) of the Occupational Safety and Health Act (the General Duty Clause) in accord with Chapter 4, Section III, of the Field Operations Manual (CPL 02-00-150, April 22, 2011).

[Note: For new tower erection, employers who fail to provide fall protection for employees at workplaces that are more than 25 feet above the ground shall be cited under 29 CFR 1926.105(a).

For construction work activities on existing towers, employers who fail to provide fall protection (guardrails, safety nets, or personal fall arrest systems) for employees at workstations with unprotected sides or edges that are six feet or more above a lower level shall be cited under 29 CFR 1926.501(b)(1). The fall protection training requirements in 29 CFR 1926.503 also apply to construction work activities on existing towers.]

¹ For additional information on the definition of construction, see the 11/08/03 Letter of Interpretation to Raymond V. Knobbs (explaining that the scale and complexity of the project – including the amount of time and material necessary to do the job – are relevant to determining whether work is construction).

Appendix A

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

Table of Contents

I.	Definitions	II
II.	Hoisting Personnel	II
III.	Training	II
IV.	Equipment	III
V.	Trial Lift and Proof Testing	IV
VI.	Pre-Lift Meeting	V
VII.	Documentation	V
VIII.	Hoisting Employees to or from the Workstation	V
IX.	Communication Between the Hoist Operator and Hoisted Employees	VI
X.	Falling Object Hazards	VII
XI.	Weather Conditions	VII
XII.	Energized Power Lines	VII
XIII.	Hydraulic Hoists (Drum Hoists)	VII
XIV.	Hoist Mounting	IX
XV.	Drums	IX
XVI.	Brakes and Clutches	IX
XVII.	Hoist Controls	X
XVIII.	Wire Rope and Rigging	XI
XIX.	Hoist Operator	XI
XX.	Hoist Inspections	XI

I. Definitions:

- A. Anti-Two Block Device: A positive acting device that prevents contact between the load block or overhaul ball and the top block (two-blocking), or a system that deactivates the hoisting action before damage occurs in the event of a two-block situation.
- B. 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.
- C. Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate the hazard(s).
- D. Qualified Person: 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 issues relating to the subject matter, the work, or the project.
- E. Gin Pole: A device attached to the tower that is used to raise sections of tower steel or equipment into position.
- F. Engineered Hoist System: A hoist system is the complete system for hoisting, including: the frame, mounts and/or anchorages, prime mover (winch assembly), motors, drums, truck chassis (if used as the base for the hoist), wheel chocks, wire rope, hour meter, foot blocks, gin pole (if used), and rooster head or cat head, as applicable.

II. Hoisting Personnel. Employees may only be hoisted on the hoist line to reach or depart from workstations in accord with the guidelines set forth in this Appendix.

III. Training. Before allowing an employee to perform any job related to hoisting employees aloft for tower work, ensure that the employee receives effective training on the fall protection equipment used and how to safely access and depart from communication towers. The operator of the hoist needs to have a thorough understanding of the guidelines in this Appendix that pertain to hoisting employees on the hoist line. Ensure that the operator is effectively trained on the entire engineered hoist system and its capabilities, safe operating procedures, and emergency procedures.

- IV. Equipment. Use an anti-two block device on all hoists, except where it can be demonstrated that the ambient radiation frequency (RF) precludes that use. In such case, establish and maintain on site a site-specific personnel hoisting operations plan to ensure that two blocking cannot occur and that effective communication is maintained between the hoist operator and personnel being hoisted. This program could provide for a cable marking system, an employee to be situated on the tower in a position to observe the top block, or any other system that will adequately ensure communication.
- A. Engineered Hoist Systems: Have a registered professional engineer approve/stamp the engineered hoist system design. Engineered system specifications are to include the size and type of rope to be used, the ratio of rope diameter to sheave size, and inspection and maintenance procedures and schedules.
 - B. Ensure that the rigging, hoist line and slings have a safety factor of 10 against failure during personnel lift(s). Make sure that the hoist line used to raise or lower employees is equipped with a swivel to prevent any rotation of the employees. Do not use spin-resistant wire rope to hoist employees.
 - C. When hoisting personnel (versus material), de-rate the hoist's specified rated capacity by a factor of 2 (reduced by half). (This is referred to herein as the "personnel load capacity.") Provide all employees with, and require employees to use, the proper personal protective equipment (including fall protection equipment). Inspect the protective equipment before each lift.
 - D. Use a guide line (tag line) to prevent the employees or the platform from contacting the tower during hoisting, except where it can be demonstrated that specific circumstances or conditions preclude its use.
 - E. Use a foot block and ensure that the specifications of the foot block (including its construction, its rating for personnel and/or materials hoisting, and its placement) are in accord with the specifications of the engineered hoist system as prescribed by a registered professional engineer.
 - F. Ensure that a competent person thoroughly inspects the gin pole before use 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.
 - G. Attach the gin pole to the tower as designed by a registered professional engineer. Ensure that the engineered hoist system specifications identify the type, number and location of attachment points.

- H. Post the personnel load capacity and specified rated capacity of the lifting system in use at the site near the location of the hoist operator. If the system is changed, update the posted capacity accordingly.
- V. Trial Lift and Proof Testing. Conduct a trial lift of the Maximum Intended Load from ground level to the location to which personnel are to be hoisted.
- A. Conduct the trial lift immediately prior to placing personnel on the hoist line.
 - B. Have the hoist operator determine that all systems, controls and safety devices are activated and functioning properly.
 - C. A single trial lift may be performed for all locations that are to be reached from a single set-up position.
 - D. Have the hoist operator determine that no interference exists and that all configurations necessary to reach the work locations remain under the limit of the hoist's specified rated capacity, and ensure that the hoist operator maintains a 10:1 factor of safety against failure.
 - E. Whenever the hoist is moved and set up in a new location or returned to a previously used position, repeat the trial lift prior to hoisting employees.
 - F. Do not lift employees after the trial lift unless the following conditions are met:
 - 1. hoist wire ropes are determined to be free of damage (see 29 CFR 1926.1413 for guidance);
 - 2. multiple part lines are not twisted around each other; and,
 - 3. proof testing was completed successfully.
 - G. If the hoist wire rope is slack, inspect the hoisting system to ensure that all wire ropes are properly seated on drums and in sheaves.
 - H. Have a competent person do a visual inspection of the hoist, rigging, base support and foundation immediately after the trial lift to determine whether testing has exposed any defect or adverse effect upon any component of the structure. Correct any defects found during the inspection that may create a safety hazard, and then perform another trial lift before hoisting personnel.
 - I. Prior to hoisting employees, and after any repair or modification, proof test the personnel rigging to 125% of the specified rated capacity 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). Use a test weight.

- J. After proof testing, have a competent person inspect the rigging. Correct any deficiencies found, and then conduct another proof test.
- VI. Pre-Lift Meeting. Hold a pre-lift meeting prior to the trial lift at each location. Ensure that the hoist operator and employees to be lifted are in attendance at the meeting. At the meeting, review the procedures to be followed and all appropriate guidelines from this Appendix. Repeat the meeting for any employee newly assigned to the operation.
- VII. Documentation. Document all trial lifts, inspections, proof tests, and pre-lift meetings, and keep the documentation on site at a readily accessible location during the entire length of the project.
- VIII. Hoisting Employees To or From the Workstation. For hoisting one employee, use a personnel platform, as prescribed by the platform manufacturer or a registered professional engineer, or a boatswain chair or boatswain chair-type full body harness in accord with the guidelines in this Appendix. For hoisting two or more employees at a time, use a personnel platform, as prescribed by the platform manufacturer or a registered professional engineer, unless the employer can demonstrate that specific circumstances or conditions preclude its use. (Note that it is important to follow any guidelines from the platform manufacturer regarding the maximum number of employees that can be hoisted at any one time.) The personnel platform should satisfy the criteria at 29 CFR 1926.1431(e). If the use of a personnel platform is infeasible, use a boatswain chair or boatswain chair-type full body harness in accord with the guidelines in this Appendix.
- A. Hoisting personnel and materials concurrently: When using a personnel platform, small, incidental materials and personal tools may be hoisted concurrently with personnel in a manner consistent with 29 CFR 1926.1431(f). When a boatswain chair or boatswain chair-type full body harness is used, hoist personnel and materials separately.
 - B. When a boatswain chair or boatswain chair-type full body harness is used to hoist employees, the following shall apply:
 - 1. do not hoist more than two employees at a time;
 - 2. attach the employee's harness to the hook by a lanyard satisfying the strength requirements at 29 CFR 1926.502(d)(9);
 - 3. use only locking-type snap hooks;
 - 4. use a harness equipped with two side rings and at least one front and one back D ring.

5. Use a hoist line hook equipped with a safety latch that can be locked in a closed position to prevent loss of contact.
- C. Hoisting Guidelines: Line speed, free-spooling, and hoisting materials.
1. When a personnel platform is not used, ensure that the maximum rate of travel does not exceed 200 feet per minute when a guide line is used to control the personnel hoist. When a guide line cannot be used, ensure that the rate of travel of the employee being hoisted does not exceed 100 feet per minute.
 2. In all personnel hoisting situations, ensure that the maximum rate of travel does not exceed 50 feet per minute when personnel being lifted come within 50 feet of the top block.
 3. Do not use free-spooling (friction lowering).
 4. When the hoist line is being used to raise or lower personnel, ensure that there is no other load attached to any hoist line, and that no other load is raised or lowered at the same time on the same hoist.
- D. Capacity:
1. Ensure that as-built drawings approved by a registered professional engineer provide the lifting capacity of the gin pole and are available at the job site. Make sure that the gin pole is included in the system designed by the registered professional engineer.
 2. Do not use the gin pole raising line to raise or lower employees. Ensure that employees maintain 100 percent tie-off while moving between the hoist line and the tower.
- IX. Communication Between the Hoist Operator and Hoisted Employees. Except as provided below, ensure that employees being hoisted remain in continuous sight of the operator or signal person.
- A. In 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) may be used.
 - B. When radios are used, ensure that they are non-trunking, closed, 2-way selective frequency radio systems. When hand signals are used, have the employees use industry standardized hand signals as illustrated in Appendix A to Subpart CC of Part 1926.

- X. Falling Object Hazards. Take all necessary precautions to avoid falling object hazards, including, but not limited to, securing tools and materials to prevent them from falling to the ground. Some examples of such methods are: using tethers for tools, or exclusion zones or barricades to control unnecessary work in hazard zones.
- XI. Weather Conditions. Do not hoist employees 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 is to be made by a competent person using recognized good practices. High winds are defined in 29 CFR 1910.269(x)(5) as: winds “of such velocity that the following hazards would be present: [1] An employee would be exposed to being blown from elevated locations, or [2] An employee or material handling equipment could lose control of material being handled, or [3] An employee would be exposed to other hazards not controlled by the standard involved.”
- XII. Energized Power Lines. Do not use the hoist system to raise and lower employees on the hoist line unless the following clearance distances 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

- XIII. Hydraulic Hoists (Drum Hoists). Ensure that the hoist used for personnel lifting meets the applicable provisions for design, construction, installation, testing, inspection, maintenance, modification, repair and operations in this Appendix and as prescribed by the manufacturer or engineered hoist system specifications.
- A. Ensure that hoist systems meet all applicable requirements for the design, construction, installation, testing, inspection, maintenance, and operation of hoists as prescribed by the manufacturer or a registered professional engineer. A hoist system is the complete system for hoisting, including: the frame, mounts and/or anchorages, prime mover (winch assembly), motors, drums, truck chassis (if used as the base for the hoist), wheel chocks, wire rope, hour meter, foot blocks, gin pole (if used), and rooster head or cat head, as applicable.

Whether the hoist system is designed by a manufacturer or a registered professional engineer, ensure that an operating manual is developed that includes system capacity, maintenance requirements, and inspection criteria. Where individual components have such manuals, they are to be incorporated into the system manual. Maintain all documentation and manuals at the work site.

- B. Where manufacturers' specifications are not available, base the limitations assigned to the equipment on the determinations of a registered professional engineer.
- C. Position the hoist 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. Anchor the foot block to prevent displacement and support the foot block to maintain proper alignment.
- D. Ensure that the hoist is designed to lift materials and personnel with the same drum or drums. Proof test any hoist that has been modified or repaired to 125 percent of its specified rated capacity. See paragraph V, Trial Lift and Proof Testing for more information.
- E. Rated load capacities, recommended operating speeds, and special hazard warnings or instructions are to be conspicuously posted on all hoists.
- F. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains or other rotating parts, where exposed, are to be totally enclosed.
- G. Post the personnel load capacity for the current configuration of the gin pole within sight of the hoist operator.
 - 1. Ensure that the hoist has an hour meter and a line speed limiter and that the hoist is designed for and uses powered lowering.
 - 2. Maintain the alignment of hoist components within manufacturer's or engineered hoist system specifications' limits that prevent premature deterioration of gear teeth, bearings, splines, bushings, and any other parts of the hoist mechanism.
- H. Guard all exhaust pipes where they are exposed. Ensure that an accessible fire extinguisher of 5BC rating or higher is available at the operator's station.
- I. Service and maintain the hoist as per the manufacturer's or registered professional engineer's recommendations.

1. The operating manual developed by the manufacturer or registered professional engineer for the specific make and model hoist being used is to be maintained at the site at all times.
 2. Use a hoist log to record all hoist inspections, tests, maintenance, and repair. Update the log daily as the hoist is being used and have the operator and/or crew chief sign the log. Have service mechanics sign the log after conducting maintenance and repair. Maintain the log at the site.
- XIV. Hoist Mounting. Ensure that the hoist is installed following the mounting specifications of the manufacturer or the engineered hoist system specifications to prevent excessive distortion of the hoist base as it is attached to the mounting surface.
- A. Make sure that the flatness of the mounting surface is held to tolerances specified by the hoist manufacturer or engineered hoist system specifications.
 - B. Anchor the hoist so that it resists at least two times the force or weight of any reaction induced at the maximum attainable line pull and so that the hoist will not twist or turn.
 - C. If the hoist is mounted to a truck chassis, ensure that it is properly aligned and anchored in at least two corners to prevent movement, and that the wheels are properly chocked.
- XV. Drums. The hoist drum is to be capable of raising or lowering 125 percent of the specified rated capacity of the hoist.
- A. Ensure that the hoist drum has a positive means of attaching the wire rope to the drum.
 - B. Ensure that there are always at least three full wraps of wire rope on the hoist drum when personnel are being hoisted.
 - C. During operation, the flange is to be two times the wire rope diameter higher than the top layer of wire rope at all times.
- XVI. Brakes and Clutches. Brakes and clutches need to be capable of arresting any over-speed descent of the load.
- A. Ensure that the hoist has a primary brake and at least one independent secondary brake, each capable of stopping and holding 125 percent of the specified rated capacity of the hoist.

- B. The primary brake is to be directly connected to the drive train of the hoisting machine, and is not to be connected through belts, chains, clutches or screw-type devices.
 - C. The secondary brake is to be an automatic emergency-type brake that, if actuated during each stopping cycle, cannot engage before the hoist is stopped by the primary brake. When a secondary brake is actuated, it needs to stop and hold the load within a vertical distance of 24 inches.
 - D. Adjust brakes and clutches where necessary to compensate for wear and to maintain adequate force on springs where used. Always use powered lowering.
 - E. When power brakes having no continuous mechanical linkage between the actuating and braking mechanism are used for controlling loads, an automatic means is to be provided to set the brake to prevent the load from falling in the event of a loss of brake actuating power.
 - F. Provide static brakes to prevent the drum from rotating in the lowering direction and ensure that the static brakes are capable of holding the specified rated capacity indefinitely without attention from the operator. Brakes are to be automatically applied upon return of the control lever to its center (neutral) position.
 - G. Brakes applied on stopped hoist drums need sufficient impact capacity to hold 1.5 times the rated torque of the hoist.
- XVII. Hoist Controls. Ensure that power plant controls are within easy reach of the operator and include a means to start and stop, a means to control the speed of internal combustion engines, a means to stop the prime mover under emergency conditions, and a means to shift selective transmissions.
- A. All controls used during the normal operation of the hoist are to be located within easy reach of the operator at the operator's station.
 - B. Ensure that controls are clearly marked (or are part of a control arrangement diagram) and are easily visible from the operator's station. Foot-operated pedals, where provided, are to be constructed and maintained so that the operator's feet will not readily slip off and so the force necessary to move the pedals can be easily applied.
 - C. The controls are to 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.

XVIII. Wire Rope and Rigging. Inspect all wire rope and rigging daily before use.

- A. Ensure that rope is of the size and type specified as part of the engineered hoist system.
- B. Ensure that all eyes in wire rope slings are fabricated with thimbles.
- C. Ensure that all eyes in wire rope slings are:
 - 1. made with swaged-type fittings; and,
 - 2. field fabricated by a qualified person or factory made.

XIX. Hoist Operator. Ensure that the hoist operator has classroom training in hoist operations, 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 has demonstrated the ability to safely operate the hoist.

- A. Do not allow an employee to operate a hoist when that employee is physically or mentally unfit.
- B. The hoist operator is responsible for those operations within the area of potential influence of the hoist system.
- C. Whenever there is any doubt as to safety, the operator is to have the authority to stop and refuse to handle the load until safety has been assured.
- D. The hoist operator is to remain at the controls at all times when personnel are on the hoist line.
- E. Before starting the hoist, the operator needs to ensure that:
 - 1. all necessary inspections have been conducted;
 - 2. all controls are in the "off" position; and,
 - 3. all personnel are in the clear.

XX. Hoist Inspections. Ensure that all hoists are visually inspected by a competent person each day before use.

- A. Ensure that a competent person thoroughly inspects all hoists at three-month intervals. Such inspection will include a hands-on operation of all moving parts to ensure that they are intact and will function properly.
- B. Ensure that all hoists undergo a tear-down inspection annually unless conditions exist (as described below) that allow for less frequent tear-down inspections:

1. A hoist that has been idle for more than six months is not to be used until it has a tear-down inspection, which includes completely disassembling, cleaning and inspecting the hoist. Before the hoist is used, replace parts such as pins, bearings, shafts, gears, brake plates, etc. found worn, cracked, corroded, distorted or otherwise non-functional.
2. Hoists with infrequent to moderate usage (hoists that have been used for 50 hours or less per month and normally operate at considerably less than the specified rated capacity based on the average use over a month) may go up to 36 months between tear-down inspections if serviced under a preventive maintenance program (as directed by the manufacturer or engineered hoist system specifications) 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. At a minimum, change oil in these hoists at least once a year, just after the oil analysis is performed. Hoists not subjected to an annual oil sample analysis need an annual tear-down inspection.
3. Hoists that experience heavy usage (hoists that are used for more than 50 hours per month) may go up to 24 months between tear-down inspections if serviced under a preventive maintenance program as in XX(B)(2) above.
4. Any rebuilt hoist assembly needs to be line pull tested to the specified rated capacity. The hoist drum needs to be rotated several times in both raising and lowering directions under full capacity load, while checking for smooth operation.