



**DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS**

**DIRECTOR'S OFFICE**

**CONSTRUCTION SAFETY STANDARDS**

Filed with the Secretary of State on **March 27, 2009**

These rules take effect 14 days after filing with the Secretary of State

(By authority conferred on the director of the department of labor and economic growth by sections 19 and 21 of 1974 PA 154, and Executive Reorganization Order Nos. 1996-2 and 2003-18, MCL 408.1019, 408.1021, 445.2001, and 445.2011)

R 408.42901, R 408.42904, R 408.42907, R 408.42910, R 408.42913, R 408.42916, R 408.42919, R 408.42922, R 408.42925, R 408.42928, R 408.42931, R 408.42934, R 408.42937, R 408.42940, and R 408.42943 are added to the Michigan Administrative Code as follows:

**PART 29. COMMUNICATION TOWERS**

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**R 408.42901 Scope.**

**Rule 2901.** These rules shall be applied as follows:

(1) These rules set forth the minimum requirements for employers to protect employees from the hazards associated with working on communication towers, which includes antenna and antenna supporting structures, broadcast, and other similar structures that support communication related equipment, during construction, alteration, repair, operation, inspection, maintenance, and demolition activities.

(2) These rules do not apply to activities performed by electric utilities and their subcontractors for the purpose of internal communications or metering on energized or induced structures related to electric energy, or for generation, control, transformation, transmission, and distribution of electric energy, which are located in buildings used exclusively by the electric utilities for such purposes, or located outdoors on property owned or leased by the electric utilities or on public right of ways; or outdoors by established rights on private property.

**R 408.42904 Availability of referenced documents.**

**Rule 2904.** (1) The Federal Communications Commission 47 CFR 1.1310 Radiofrequency Radiation Exposure Limits Standard is adopted by reference in these rules and is available without cost as of the time of adoption of these rules by accessing the United States Government Printing Office at website: [http://www.access.gpo.gov/nara/cfr/waisidx\\_06/47cfr1\\_06.html](http://www.access.gpo.gov/nara/cfr/waisidx_06/47cfr1_06.html) then scrolling down to 1.1310 Radiofrequency Radiation Exposure Limits, or from the Michigan Department of Labor and Economic Growth, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909.

(2) The following Michigan occupational safety and health standards are referenced in these rules. Up to 5 copies of these standards may be obtained at no charge from the Michigan Department of Labor and Economic Growth, MIOSHA Standards Section, 7150 Harris Drive, P.O. Box 30643, Lansing, Michigan, 48909-8143 or via the internet at website:

<http://www.michigan.gov/mioshastandards>.  
For quantities greater than 5, the cost, as of the time of adoption of these rules, is 4 cents per page.  
(a) Construction Safety Standard Part 1 General Rules, R 408.40101 to R 408.40134.

(b) Construction Safety Standard Part 10 Lifting and Digging Equipment, R 408.41001a to R 408.41099a.

(c) Construction Safety Standard Part 11 Fixed and Portable Ladders, R 408.41101 to R 408.41140.

(d) Construction Safety Standard Part 21 Guarding of Walking and Working Areas, R 408.42101 to R 408.42160.

(e) Construction Safety Standard Part 45 Fall Protection, R 408.44501 to R 408.44502.

(f) Occupational Health Standard Part 472 Medical Services and First Aid, R 325.47201.

(3) The following standards are adopted by reference in these rules and are available from IHS Global, 15 Inverness Way East, Englewood, Colorado, 80112, USA, telephone number: 1-800-854-7179 or via the internet at website: <http://global.ihs.com>; at a cost as of the time of adoption of these rules, as stated in this subrule:

(a) ANSI/TIA-1019 2004 Structural Standards for Steel Gin Poles Used for Installation of Antenna Towers and Antenna Supporting Structures. Cost \$109.00.

(b) ISO Standard 4406, Hydraulic Fluid Power--Fluids--Method for Coding the Level of Contamination by Solid Particles, Second Edition, December 1999. Cost: \$60.00.

(c) The standards referenced in subrule 3(a) and (b) of this rule are also available for inspection at the Department of Labor and Economic Growth, MIOSHA Standards Section, 7150 Harris Drive, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(d) Copies of the standards referenced in subrule 3(a) and (b) of this rule may be obtained from the publisher or may also be obtained from the Department of Labor and Economic Growth, MIOSHA Standards Section, 7150 Harris Drive, P.O. Box 30643, Lansing, Michigan, 48909-8143, at the cost charged in subrule 3(a) and (b), of this rule, plus \$20.00 for shipping and handling.

#### **R 408.42907 Definitions.**

**Rule 2907.** (1) "Anti-two block device" means 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-blocking situation.

(2) "Authorized climber" means an individual with the physical capabilities to climb; who may or may not have previous climbing experience; has been trained in fall protection regulations, the equipment that applies to communication structures work, and instruction for proper use of the equipment.

(3) "Boatswain chair" [bosun chair (seat)] means a seat consisting of a board and a rope and any support where a person can sit (especially the part of a chair or bench, or similar equipment on which the person sits) for working at heights on structures.

(4) "Brakes" mean a mechanical or hydraulic system that can decelerate or stop a load.

(5) "Catheads or capstans" mean a spool-shaped metal mechanical device mounted on the end of a shaft around which a rope is wrapped. A capstan is similar to a cathead but is mounted in the vertical position.

(6) "Competent person" means 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 problems.

(7) "Crew chief/supervisor/foreman" means one who is authorized and designated as competent and qualified by the employer.

(8) "Crown block (top block or load block)" means the sheave assembly used to change the direction of the load line or jump line coming from the hoist and is attached at the uppermost location of the structure for the project to lift loads.

(9) "Drum" means a cylindrical member with flanges on each end around which rope is wound for lifting or lowering a load.

(10) "Flemish eyes (Molly Hogan)" means an eye splice made by using stranded cable and weaving them together to make an eye.

(11) "Foot block" means a block stationed at the base of a structure that allows the wire rope to change direction 90 degrees to go up the structure.

(12) "Full body harness" means a body support that is designed to contain the torso in such a manner that fall arrest forces are distributed over at least the upper thighs, pelvis, chest, and shoulders.

(13) "Gin pole" means a device unique to the telecommunications industry used to raise successive sections of tower steel, antennas, or equipment into position. This temporary device allows headroom above the highest fixed point of the tower or structure.

(14) "Gross load" means the total load to be lifted. This includes the weight of the lifted object, headache ball, the load line, tag line, and any other attachments.

(15) "Hoist mechanism or hoist" means the complete unit including frame, prime mover (winch assembly), pumps, motors, drums, and any associated equipment that is necessary to make the complete unit work.

(16) "Hoisting" means the act of lifting and lowering loads or personnel.

(17) "Load chart" means a chart used to determine the lifting capacities under specified parameters and an understanding of the working parameters within which the capacities are to be used.

(18) "Load line" means a wire rope of sufficient size and strength to raise the intended gross load safely.

(19) "Maximum intended personnel load/gross load" means 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.

(20) "Oil sample analysis" means a method used to evaluate oil, which may not mean a laboratory analysis, but can be effectively accomplished in the field by a qualified person.

(21) "One-hundred percent (100%) fall protection" means each employee exposed to fall hazards above 6 feet while ascending, descending, or moving point to point, must be protected by fall protection, as described in R 408.42910 Fall protection, at all times.

(22) "Operator" means a person who runs (operates) equipment, such as winches, cranes, or hoists.

(23) "Pitch diameter" means the root diameter of drum, lagging or sheave, plus the diameter of the rope.

(24) "Positive locking system" means a system that creates a mechanical means of ensuring that the connection or interface between 2 components will not slip.

(25) "Powered lowering" means the act of controlled lowering of a load by the use of a system or device in the power train, which can control the lowering speed of the winch assembly.

(26) "Prime mover" means the system that provides the energy to rotate the winch assembly.

(27) "Proficient" means a thorough competence derived from training and practice.

(28) "Proof test" means the act of testing the rigging and hoist mechanism whenever newly rigged or after any changes are made to the hoist mechanism or rigging.

(29) "Pulley" means a sheave wheel that is grooved on the outer circumference to hold a wire rope in place while turning and allows a mechanical advantage for lifting or a change in direction.

(30) "Qualified person" means a person 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.

(31) "Rated capacity" means the load that a winch assembly may handle under given operating conditions and at a known design factor.

(32) "Rigging" means, but is not limited to, chains, ropes, pulleys, hooks, and all accompanying hardware for lifting, lowering, suspending, and fastening loads.

(33) "Side plates" means the side plates of sheaves or double plate attachment points that support the sheave.

(34) "Similar structures" means any structure that holds equipment relevant to the communication industry.

(35) "Slings" means a looped wire rope, strap, or chain for supporting, cradling, or lifting an object.

(36) "Static brakes" means brakes used once the motion of the drum has come to a complete stop to prevent creeping or slippage. Static brakes are not necessarily separate from the primary braking system or may be redundant in application. A locking device on a primary braking system may be used.

(37) "Tag line and/or trolley line" means a method or system of applying a force to control a load and having the ability to create a space between the load and structure or gin pole.

(38) "Teardown inspection" means the complete disassembly, cleaning, inspection, and replacement of all worn, cracked, corroded or distorted parts such as pins, bearings, shafts, gears, brake rotors, brake plates, drum, and base that may affect the operation of the winch assembly.

(39) "Trial lift" means testing a specified load weight from ground level to the location of where personnel or equipment are to be hoisted.

(40) "Two blocking" means an unsafe condition that occurs on a system when the overhaul ball, hook block, or headache ball on the load line comes in contact with the main load sheave.

(41) "Winch assemblies" means a device with a cylindrical drum with end flanges, shaft, shaft support, gears, and brakes used to lift or lower items.

#### **R 408.42910 Fall protection.**

**Rule 2910.** (1) Prior to employees being exposed to elevations above 6 feet, the employer shall ensure that 100% fall protection systems compatible with the tasks assigned are provided, used, and maintained as required in this rule.

(2) These rules shall not require the retrofitting of communication towers provided that employees who are exposed to fall hazards above 6 feet while performing work on communication towers are protected from such hazards by means of a 100% fall protection system.

(3) In addition to the criteria for pre-climb planning and inspection included in subrule (8) of this rule, all of the following shall occur prior to employees climbing the tower at heights above 6 feet:

(a) All projects requiring climbing shall be planned by a competent person.

(b) All climbing facilities shall be visually inspected daily at the tower base by a competent person for rust, corrosion, deterioration, or other hazards on the climbing facilities that could lead to death or injury of an employee in the performance of their duties. Additionally, the climbing facilities shall be visually inspected for these items as the employees ascend to the elevation point where work is being performed. If any such hazard is identified during this inspection, employees shall not use the climbing facility until such hazards are abated.

(c) A competent person shall ensure that all fall protection equipment is inspected prior to each use for wear, damage, defect, or other deterioration by employees who have been trained in accordance with R 408.42916. Defective equipment shall be identified and tagged as defective and immediately removed from service.

(d) Components of a fall protection system and the fall protection equipment utilized by employees shall be compatible with one another and shall be used in accordance with Construction Safety Standard Part 45 Fall Protection, being CFR 1926.502(d) Personal fall arrest systems, adopted by reference in R 408.44501 and R 408.44502.

(e) The planning and inspections shall be performed and documented. The documentation shall be maintained on-site while work is being performed. The documentation shall include the date of the planning and inspection, the name of the competent person performing the planning and inspection, and the site location.

(4) An employer shall comply with the requirements of subrule (1) of this rule in 1 of the following ways:

(a) Permit employees to use the 100% fall protection systems described in subrules (5) to (8) of this rule.

(b) If the fall protection systems described in subrules (5) to (8) of this rule are not present, the employer shall not permit employees to climb the tower at heights above 6 feet unless at least 1 of the following conditions is met:

(i) An alternative means of 100% fall protection is used that is at least as effective as the fall protection systems described in subrules (5) to (8) of this rule.

(ii) An alternative means of access to the work area is used such as an aerial lift or elevated work platform.

(iii) The employer can demonstrate that the requirements for a fall protection plan under subrule (4)(c) of this rule have been met.

(c) When employees are working on a structure where no adequate tie-off anchorage points exist, the fall protection systems described in subrule (4)(a) and (b) of this rule are not feasible or create a greater hazard, and the work cannot be completed utilizing an alternative means of access to the work area such as an aerial lift or elevated work platform, then an employer shall comply with Construction Safety Standard Part 45 Fall Protection, R 408.44501 and R 408.44502, and ensure all of the following:

(i) That each employee under the fall protection plan has been trained as an authorized climber.

(ii) That the fall protection plan shall be made available and communicated to exposed employees prior to the employees beginning work, and such communication shall be documented by the employer.

(iii) That the fall protection plan shall identify each location on the tower/structure where fall protection methods as described in subrule (4)(a) and (b) of this rule cannot be used. As soon as adequate tie-off anchorage points or other fall protection systems can be established, the employer shall use any of the fall protection systems described in subrule (4)(a) and (b) of this rule.

(5) Guardrail systems and their components that are used by employees as a means of 100% fall protection shall conform to the criteria in Construction Safety Standard Part 45 Fall Protection, being CFR 1926.502(b) Guardrail systems, adopted by reference in R 408.44501 and R 408.44502.

(6) Personal fall arrest systems and their components that are used by employees as a means of 100% fall protection shall conform to the criteria in Construction Safety Standard Part 45 Fall Protection, being CFR 1926.502(d) Personal fall arrest systems, adopted by reference in R 408.44501 and R 408.44502. The employer shall ensure that the attachment points to the structure, when used by employees as an anchorage as part of a personal fall arrest system (PFAS), are designed to meet the requirements of an approved anchorage in accordance with Construction Safety Standard Part 45 Fall Protection, being CFR 1926.502(d) Personal fall arrest systems, adopted by reference in R 408.44501 and R 408.44502.

(7) Positioning device systems and their components that are used by employees as a means of 100% fall protection shall conform to the criteria in Construction Safety Standard Part 45 Fall Protection, being CFR 1926.502(e) Positioning device systems, adopted by reference in R 408.44501 and R 408.44502.

(8) In addition to the applicable criteria in Construction Safety Standard Part 11 Fixed and Portable Ladders, R 408.41101 to R 408.41140 and Part 21 Guarding of Walking and Working Areas, R 408.42101 to R 408.42160, ladder safety systems and related support systems for fixed ladders that are used by employees as a means of 100% fall protection shall conform to all of the following criteria:

(a) Prior to climbing the structure, a competent person shall ensure that the ladder safety system has been inspected for proper operation and that all components used with the ladder safety system are compatible.

(b) To perform an inspection required by subrule (8)(a) of this rule, employees shall do all of the following:

(i) Approach the ladder at the base and connect to the functional safety climb system.

(ii) Attach to the base of the fall arrest system. If the attachment point is above 6 feet, then 100% fall protection shall be used. The 100% fall protection shall be attached to an alternate approved anchorage point.

(iii) Forcibly engage the device without letting go of the ladder.

(iv) If the device does not function properly, employees shall not use the device until it functions properly.

(c) If a ladder is obstructed, inhibiting the effective use of the ladder safety system, an alternative means of 100% fall protection shall be used that is at least as effective as the types of fall protection described by this rule.

#### **R 408.42913 Emergency response.**

**Rule 2913.** (1) The employer shall establish and document procedures for rescue of employees in the event of an emergency, which shall include whether the employer will designate its own employees to perform the rescue procedures or whether the employer will designate a third party to perform the rescue procedures. The documented procedures shall be available for review by the director of the Michigan Department of Labor and Economic Growth or his or her designee, upon request.

(2) When an employer uses employees to provide elevated (high angle) rescue and emergency services, the following measures shall be taken:

(a) Ensure at least 2 rescue-trained employees are on-site when employees are working at heights over 6 feet on the structure. When there are only 2 employees on-site and 1 of these employees has been employed for less than 12 months, then that new employee must minimally have documented rescue training which includes steps to be taken in an emergency.

(b) Ensure that personal protective equipment (PPE) and high angle rescue equipment needed to conduct elevated rescues are provided, utilized, and maintained by the rescue-trained employees.

(c) Train rescue employees so they are proficient in the use and maintenance of PPE and high angle rescue equipment needed to conduct elevated rescues.

(d) Train rescue employees to perform assigned rescue duties to ensure that they maintain the ability to perform and demonstrate such duties by conducting and documenting simulated rescue operations at least once every 12 months. The employer shall keep documentation available for review by the director of the Department of Labor and Economic Growth or his or her designee, upon request.

(3) An employer who designates a third-party rescue and emergency service to provide elevated (high angle) rescue and emergency services shall take all of the following measures:

(a) Obtain verification from the third-party rescue team or service that it is able to respond to a rescue summons in a timely manner.

(b) Obtain verification from the third-party rescue team or service that it is proficient with rescue-related tasks and equipment as they relate to rescuing climbers from elevated heights on communication structures.

(c) Select a rescue team or service from those evaluated that has verified it has the capability to reach the victims and is equipped for and capable of performing the needed rescue services.

(d) Provide the selected rescue team or service with contact information regarding all towers/structures from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations as it deems necessary.

(e) Provide the selected rescue team or emergency service, prior to the first day on which employees perform work at heights over 6 feet, of the site and location of the structures, the number of employees that will ascend/descend the structures, the heights at which employees will be working, the names and telephone numbers for any employer contacts, expected project duration, and any other information that is requested by the rescue team or emergency service.

(4) In addition to the requirements of Occupational Health Standard Part 472 Medical Services and First Aid, R 325.47201, and Construction Safety Standard Part 1 General Rules, R 408.40132 Medical services and first aid, the employer shall ensure that at least 2 employees on site are trained and hold current certifications in basic first aid and cardiopulmonary resuscitation (CPR) issued by the American Red Cross or any other organization whose standards are equivalent to the American Red Cross. When there are only 2 employees on-site and 1 of these employees has been employed for less than 6 months, then only the other employee must be trained and hold current certifications in basic first aid and CPR.

#### **R 408.42916 Training.**

**Rule 2916.** (1) In order for employees to work at heights above 6 feet, they must be approved for such work by a competent person.

(2) Training of employees shall be performed by a qualified person able to perform such training.

(3) The employer's written work procedures shall be provided to employees as part of their training.

(4) Pictures and symbols may be used as a means of instruction if employee understanding is improved using this method.

(5) The employer shall ensure that each employee working at heights above 6 feet has been trained in all of the following areas:

(a) The nature of fall hazards in the work area.

(b) The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.

(c) The correct procedures for inspecting fall protection equipment for wear, damage, defect, or deterioration.

(d) Climbing safety procedures.

(e) The use and operation of the fall protection systems used by the employer, as described in R 408.42910(4).

(f) The role of employees in fall protection plans.

(g) The compatibility of fall protection equipment and fall protection systems.

(6) All employees who may be exposed in excess of the general population/uncontrolled maximum permissible exposure (MPE) limits stated in the Federal Communications Commission 47 CFR 1.1310 Radiofrequency Radiation Exposure Limits Standard shall receive radio frequency (RF) hazard awareness training by a qualified person able to perform such training in all of the following areas:

(a) General population/uncontrolled MPE limits.

(b) Recognition of RF exposure sources in communication tower work.

(c) Proper use and interpretation of RF exposure.

(d) Work procedures to avoid excessive RF exposure.

(e) Proper use of RF protective clothing and other related PPE.

(f) Symptoms and health issues related to RF exposure.

(g) RF exposure first-aid procedures.

(h) Exposure to induced current hazards.

(7) Employers shall ensure that each affected employee who works in an electromagnetic energy environment with potential RF exposure in excess of the general population/uncontrolled MPE limits stated in the Federal Communications Commission 47 CFR 1.1310 Radiofrequency Radiation Exposure Limits Standard has access and understands the specific site information related to the RF energy and RF fields present at each individual site.

(8) When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by this rule, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, the following situations:

(a) Changes in the workplace render previous training obsolete.

(b) Changes in the types of fall protection systems or equipment to be used render previous training obsolete.

(c) Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

#### **R 408.42919 Training certification and records.**

**Rule 2919.** (1) The employer shall document that each employee has been trained with a certification record that includes all of the following:

(a) The identity of the person trained.

(b) The signature of the employer or the qualified person who conducted the training.

(c) The date that training was completed.

(d) A description of the training.

(2) The employer shall maintain a copy of the training lesson plan for each topic of instruction.

(3) The employer shall prepare the certification record at the completion of the training required by these rules and shall be maintained for the duration of the employee's employment.

(4) The most current certification record shall be kept available for review by the director of the Department of Labor and Economic Growth or his or her designee, upon request.

(5) An employer may accept training records or certificates for previous training if the employer verifies that all training and knowledge is up-to-date and applicable to the new employee's job duties.

#### **R 408.42922 Hazard identification.**

**Rule 2922.** (1) In addition to the inspections required by R 408.42910(3), the employer shall ensure that a hazard assessment is performed to identify, assess, and control employee exposure to hazards as required by these rules and any other applicable state or federal statutes, rules, or regulations. Hazard assessments required by this rule shall be documented as follows:

(a) Initially and daily for each site by a competent person prior to permitting employees to climb the structure.

(b) When safety and health information or change in workplace conditions indicates that a new or increased hazard may be present.

(2) The hazard assessments required by this rule shall do the following:

(a) Be performed by a competent person.

(b) Evaluate new equipment, materials, and processes for hazards before they are introduced into the workplace.

(c) Identify meteorological conditions that could affect work at heights above 6 feet on a tower, such as wind, rain, snow, or ice.

(3) If hazards are identified, the employer shall assess the severity of identified hazards and implement means to control such hazards, including providing employees with personal protective equipment (PPE) designed to control the identified hazards and ensuring the proper use of the PPE by the employees.

#### **R 408.42925 Hoists.**

**Rule 2925.** (1) Prior to the use of hoists during construction, alteration, repair, maintenance, or demolition of communication towers, the employer shall ensure that they meet the following requirements:

(a) All hoists and operations shall meet the requirements of Construction Safety Standard Part 10 Lifting and Digging, R 408.41001a to R 408.41099a, where applicable.

(b) All applicable requirements for design, construction, installation, testing, inspection, maintenance, and operation of hoists as prescribed by the manufacturer or a licensed professional engineer are met.

(c) The operating manual developed by the manufacturer, or licensed professional engineer, for the specific make and model hoist being used, as well as documentation for any inspection, testing, and operator training certification required by these rules shall be maintained at the work site.

(d) Documentation shall be maintained that the hoist operator has practical training on the hoist being operated.

(2) The employer shall ensure that when mounting the hoists and winches, all of the following provisions shall apply:

(a) Attachment of the winch assembly to the structure shall be sized to resist at least 2.0 times the reactions induced at the maximum attainable line pull.

(b) The alignment of winch assembly components will be maintained within limits that shall prevent premature deterioration of gear teeth, bearings, splines, bushings, and any other parts of the hoist mechanism.

(c) The hoist mechanism may be designed to lift materials and also personnel with the same drum or drums.

(d) Winch assemblies shall comply with all of the following:

(i) The winch drum shall have a positive means of attaching the wire rope to the drum.

(ii) The winch drum and load blocks shall have a diameter or enough layers on the drum to maintain a minimum of an 18:1 pitch diameter ratio to the wire rope.

(iii) If the winch drum cannot maintain an 18:1 pitch diameter ratio on the bare drum, then at least 3 wraps shall be maintained.

(iv) During operations the drum flange will be a minimum of 1/2 inch higher than the top layer of the wire rope.

(e) Hoist brakes shall comply with all of the following:

(i) Brakes shall be capable of controlling the descent of a load.

(ii) Brakes shall be capable of stopping the load in such a way as that it does not induce shock loading.

(iii) If the hoist mechanism has the ability to free spool, then it shall have a means of a positive locking system to prevent free spooling during personnel hoisting.

(f) Winch assemblies shall be provided with a primary brake and at least 1 independent secondary brake, each capable of holding 125% of the lifting capacity of the hoist.

(i) The primary and secondary brake shall be directly connected to the drive train of the winch assembly and shall not be connected through belts, chains, etc.

(ii) The primary and secondary brake, when actuated, shall decelerate, stop, and hold the load in a controlled manner that will not induce shock loading.

(g) Brakes shall be provided with adjustments, where necessary, to compensate for wear and to maintain adequate force on springs where used.

(h) Brakes shall be provided to prevent the drum from rotating in the lowering direction and shall be capable of holding the load indefinitely without attention from the operator.

(i) An automatic means to set brakes in the event the loss of brake actuating power shall be provided on winch assemblies that have no continuous mechanical linkage between the brake actuator and the brake.

(j) Static brakes shall be provided to hold the drum from rotating in the lowering direction and shall be capable of holding the load indefinitely without attention from the operator. Brakes shall be automatically applied upon return of the control lever to its center (neutral) position. Brakes, which are applied on stopped hoist drums, shall have sufficient impact capacity to hold 1.5 times the rated torque of the hoist.

(k) Hoist controls shall comply with all of the following:

(i) The hoist mechanism shall have at the operating station a means to start and stop the prime mover under emergency conditions.

(ii) All controls used during the normal operation of the hoist mechanism shall be located within easy reach of the operator while at the operator's station.

(iii) All control levers must spring return to neutral when released or have a comparable system that allows the braking mechanism to set automatically.

(iv) All control levers shall be clearly marked and easily visible from the operator's station.

(v) Foot-operated pedals, where provided, shall be constructed so the operator's feet will not readily slip off and the force necessary to move the pedals shall be easily accomplished.

(vi) Foot-operated brakes shall be equipped with a locking device to maintain the brake in a loaded position.

(l) The manufacturer's guidelines for repair and modification shall be used; however, when these are not available, the following minimum guidelines shall be used:

(i) Repaired hoists shall be line pull tested to the maximum rated load and the winch assembly shall be rotated several times in both hoisting and lowering directions under maximum rated load while checking for smooth operation.

(ii) Prior to initial use, all new, altered, or modified hoist mechanisms shall be inspected by a qualified person.

(iii) Documentation of all modifications and repairs shall be maintained and available for review for a minimum of 2 years.

(iv) A qualified person shall monitor all repairs or modifications. If modifications alter the line pull or performance of the unit, then a revised load chart must be installed to reflect the change.

(m) Hoist/winch guarding shall comply with all of the following:

(i) Belts, pulleys, gears, shafts, sprockets, spindles, drums, fly wheels, chains, or other rotating parts shall be fully guarded to prevent employee contact.

(ii) All exhaust pipes shall be guarded where exposed to employee contact.

(n) For inspections, testing, and maintenance, the manufacturer's guidelines and recommendations shall be used. However, when not available, the following minimum guidelines shall be used:

(i) A competent person, knowledgeable of hoists, shall complete inspections.

(ii) All repair and inspection records shall be available and accessible for a minimum of 2 years.

(iii) A tear down inspection record shall be available until the next teardown inspection is completed.

(iv) Any hoist that has been idle for a period of over 6 months shall be given an annual inspection.

(v) Any hoist that has an unknown history of repair or maintenance shall have a tear down inspection.

#### **R 408.42928 Catheads or capstans.**

**Rule 2928.** When operating catheads or capstans the employer shall ensure that the following requirements are met:

(a) The operator will be properly trained on the operation of catheads or capstans.

(b) The operator shall use at least 3 wraps of rope on the drum and not place so many wraps on the drum as to allow the rope to ride over the end of drum.

(c) Precautions shall be taken to prevent entanglement of other lines with a line in use on a cathead.

(d) When a cathead is unattended, a rope or line shall not remain wrapped on or in contact with the cathead.

(e) A qualified employee shall attend the draw works control when a manually operated cathead is in use.

(f) A splice shall not be allowed to contact the cathead friction surface, with the exception of endless rope properly spliced.

(g) A natural or synthetic rope shall not be used for load carrying service if any of the following apply:

- (i) It is frozen or has been subjected to corrosive chemicals or extreme temperatures.
- (ii) It has begun to unravel.
- (iii) It has external abrasions, cuts, or broken fibers, decay, burns, softness, or variation in size or roundness.
- (iv) It has internal presence of grit, broken fibers, mildew or mold, color change, powdering, or loose fibers.
- (h) Natural or synthetic rope shall not be used if there is exposure to corrosive substances, chemicals, or heat.
- (i) Catheads or capstans shall not be used to raise or lower personnel or to lift loads directly over personnel.

**R 408.42931 Gin poles.**

**Rule 2931.** When installing gin poles, the employer shall ensure that the following requirements are met:

- (a) The gin pole shall be attached to a structure in an arrangement, as shown in Figure 2.1 of the ANSI/TIA-1019 2004 Structural Standards for Steel Gin Poles Used for Installation of Antenna Towers and Antenna Supporting Structures, with its upper portion cantilevering above the tower top.
- (b) The employer shall ensure that when the gin pole is designed, consideration shall be given to the possibility of personnel climbing the pole to perform rigging functions and for tie off points to accommodate fall protection equipment.
- (c) The rooster head which is located at the top of the gin pole shall meet the following requirements:
  - (i) The side plates shall have bolts or pins with spacers around the sheave so the load line is held in place and side plate distance is controlled.
  - (ii) Sheave diameter and groove shall be designed for the load line size intended.
  - (iii) The distance between the sheave edge and the side plate shall not exceed 25 percent of load line diameter.
- (d) Tracks used to guide and support gin poles during the jumping process shall not be used as a bridle or mid-level support unless specifically designed for such use.
- (e) The load line is used to raise and lower the intended load. The load line shall leave the hoist at ground level, go through a block at the base of the tower, then up through the middle of the pole, through the rooster head and back down to the ground to pick up the intended load.
- (f) A gin pole chart shall be provided for each pole. Gin pole charts shall contain all of the following information as a minimum:
  - (i) Identification number or other reference.
  - (ii) Gin pole description.
  - (iii) Safe lifting capacities (gross load) based on cantilever projection (La), overall gin pole length (L), and type of tag.
  - (iv) Reaction forces at gin pole attachment points.
  - (v) A table to convert degrees to a field measurement.
  - (vi) A warning that the load chart is for lifting loads and to reduce the safe lifting capacity by 1/2 when lifting personnel.

(g) All lifts shall be within the ratings allowed in the "Load Chart." Any lift or lifting to be allowed on a special basis, which is outside of the "Load Chart", shall only be allowed at the direction of a professional engineer. Special monitoring and measuring conditions, as specified by the engineer, shall be provided and used in the field during all "Special Engineered Lifts."

- (h) Markings for gin poles shall be as follows:
  - (i) Each gin pole shall be permanently marked with an identification number that references a specific load chart.
  - (ii) For proper assembly, each section and leg of the gin pole shall be marked in a specified sequence.
  - (i) The designer/engineer specified straightness tolerances shall be used for inspection. Minimum inspection criteria for gin poles shall be as follows:
    - (i) A detailed documented inspection annually or within 1 year prior to being placed in service.
    - (ii) A general visual inspection during assembly prior to use on a specific project.
    - (iii) After any abnormal occurrence.
    - (j) Rigging equipment for the gin pole shall comply with all of the following:
      - (i) Wire rope, slings, chains, shackles, turnbuckles, links, hooks, sheaves, rotating rooster heads, blocks, and hoists, used in a gin pole lifting arrangement shall meet the manufacturer's safe working load limits. In addition, each component shall have a nominal breaking strength of not less than 5 times the static load applied. Consideration for end fitting losses and actual positioning of connecting parts shall be given.
      - (ii) Lugs or other devices for lifting or attaching the gin pole in position shall be designed with load and resistance factors appropriate for their intended use.
      - (iii) Only alloy chains marked by the manufacturer with an 8, T, or A, rated for lifting, shall be used.
      - (iv) Only quenched and tempered hooks and shackles shall be used. The manufacturer's load rating shall be stamped on the product.
      - (v) The breaking strength of the sheave shall equal or exceed the breaking strength of the wire rope intended for the sheave.
    - (k) Gin pole use shall comply with the following:
      - (i) A user's gin pole load chart shall be provided for each pole.
      - (ii) Any special engineered lift that is outside of the load chart shall only be allowed at the direction of a licensed professional engineer. Monitoring and measuring conditions, as specified by a licensed professional engineer, shall be provided and used during all special engineered lifts.
      - (iii) Modifications or repairs of a gin pole shall be made with like or similar materials to meet or exceed the original specifications. Modifications or repairs shall be recertified by a licensed professional engineer.
      - (iv) A mechanism shall be in place to prevent the gin pole from tipping during the jumping process.



- (l) Wire rope used for rigging shall be as follows:
  - (i) Compatible with the sheaves of the rooster head and hoisting blocks.
  - (ii) Lubricated in accordance to manufacturer specifications to prevent corrosion and wear.
  - (iii) End connections shall be terminated per industry and manufacturer's specifications.
  - (iv) Wedge sockets shall have a minimum tail length of 1 rope lay with a properly torqued clip attached to prevent accidental disengagement.
  - (v) Only manufactured Flemish eyes will be acceptable.
- (m) The employer shall ensure that gin pole inspections include all of the following:
  - (i) Gin poles shall have a documented inspection annually by a qualified person.
  - (ii) In addition to the annual inspection, the employer shall designate a competent person who shall visually inspect the gin pole and rigging prior to each use, and during use, to ensure it is in safe operating condition. Any deficiencies shall be repaired before use continues.
  - (iii) During each inspection, a qualified person or a competent person shall do all of the following:
    - (A) Inspect the legs and bracing members for bends or distortion.
    - (B) Inspect the straightness tolerances for the overall assembly (including leg and bracing members).
    - (C) Visually inspect the welds for quality, deformation, cracks, rust, pitting, or loss of cross sectional area.
    - (D) Inspect the members for excessive rust, pitting, or loss of cross sectional area.
    - (E) Inspect the sling attachment points for distortion, wear, cracks, and rust.
    - (F) Ensure that proper bolts are utilized and all associated hardware is in good condition.
    - (G) Inspect side plates on rooster heads for distortion or other damage.
    - (H) Inspect all attachment hardware, including rigging and parts such as cables, slings, and sling attachment points, shackles, hooks, and sockets for wear, distortion, cracks, and rust.
    - (I) Ensure that all problems identified during the inspection are corrected before placing the gin pole into service.

**R 408.42934 Personnel lifting.**

**Rule 2934.** (1) Before an employee may perform any job related to hoisting employees aloft for work, the employee shall receive training on safe access pursuant to these rules. The operator of the hoist shall have a thorough understanding and comply with subrules (2) to (9) of this rule pertaining to hoisting employees on the hoist line.

(2) 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 case, a site-specific rigging plan shall 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 plan may include a cable marking system, an employee situated on the tower in a position to observe the top block, or any other system that will adequately ensure communication. All of the following shall apply:

(a) A qualified person shall make the following determinations:

(i) The rigging, hoist line, and slings shall have a factor of safety of 10:1 against failure during personnel lifts.

(ii) The hoist line used to raise or lower employees must be wire rope and may be equipped with a swivel to prevent any rotation of the employees.

(iii) If a swivel is not used, then an alternate means shall be used to keep the employees under control at all times.

(iv) If spin resistant wire rope is used, additional and more frequent inspections are required due to different wear trends.

(b) When hoisting personnel (versus material), the hoist capacity load rating shall be de-rated by a factor of 2 (reduced by 1/2) and must maintain a 10:1 factor of safety after the reduction is considered. All employees shall be provided with and required to use the proper personal protective equipment (including fall protection equipment) that shall be inspected before each day before use.

(c) 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.

(d) 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 cracked or broken welds at joints, and general deterioration.

(e) The gin pole shall be attached to the tower as designed by a registered professional engineer. There shall be a minimum of 2 attachment locations at the bottom of the gin pole and near the top of the tower or the highest position available on the structure.

(f) 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.

(g) In situations where a gin pole is not being used on a communication tower and similar structures, a crown block may be used on the structure instead of a gin pole for access to the work location.

(3) 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.

(a) The trial lift shall be made immediately prior to placing personnel on the hoist line.

(b) The hoist operator shall 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) 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 and additionally maintain a 10:1 factor of safety against failure.

(e) 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.

(f) After the trial lift, employees shall not be lifted unless the following conditions are met:

(i) Hoist wire ropes are determined to be free of damage in accordance with the provisions of Construction Safety Standard Part 10. Lifting and Digging Equipment, R 408.41001a to R 408.41099a.

(ii) Multiple part lines are not twisted around each other.

(iii) The proof testing requirements have been satisfied.

(g) 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.

(h) 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.

(i) Any defects found during the inspection that may create a safety hazard shall be corrected and another trial lift shall be performed before hoisting personnel.

(ii) Prior to hoisting employees and after any repair or modification, the system shall be proof tested to its rated load, holding it in a suspended position for 5 minutes with the test load evenly distributed (this may be done concurrently with the trial lift).

(iii) After proof testing, a competent person shall inspect the rigging. Any deficiencies found shall be corrected and another proof test shall be conducted.

(4) A pre-lift meeting shall be held before the trial lift at each location and each time a new employee is assigned to the operation. The pre-lift meeting shall meet both of the following requirements:

(a) The hoist operator, each employee to be lifted, and the crew chief shall attend.

(b) The hoist operator shall review the procedures to be followed and all appropriate requirements contained in this rule with the other individuals present.

(5) The employer shall ensure that all trial lifts, inspections, and proof tests shall be performed and documented, and the documentation shall remain on site during the entire length of the project. The employer shall ensure that the pre-lift meeting is documented, and the documentation shall remain on site during the entire length of the project.

(6) Employees shall be hoisted to their work stations by using a personnel platform or by using a boatswain chair and/or boatswain seat-type full body type harness.

(a) When a boatswain chair or boatswain seat-type full body harness is used to hoist employees, the following shall apply:

(i) Not more than 2 employees may be hoisted at a time.

(ii) When hoisting an employee in a boatswain type full body harness, the harness shall be attached to the hoist wire rope line in such a manner as to utilize the boatswain seat part of the harness, placing the employee into a sitting position and a fall arrest lanyard must be attached from the back D ring of the full body harness to a separate attachment point.

(iii) Only locking-type snap hooks shall be used.

(iv) The harness shall be equipped with 2 side rings and at least 1 front and 1 back D ring.

(v) The hoist line hook shall be equipped with a safety latch that can be locked in a closed position to prevent loss of contact.

(vi) Employees must maintain 100% tie-off while moving between the hoist line and the tower.

(b) When a personnel platform is used, the following provisions must be followed:

(i) The maximum rate of travel shall not exceed 200 feet per minute when a tag or trolley line is used to control personnel hoists. When a tag or trolley line cannot be used, the rate of travel of the employee being hoisted shall not exceed 100 feet per minute.

(ii) In all personnel hoist situations, the maximum rate shall not exceed 50 feet per minute when personnel being lifted approaches to within 50 feet of the top block.

(iii) The use of free-spooling (friction lowering) is prohibited. When the hoist line is being used to raise or lower employees, 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.

(iv) 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.

(v) The gin pole raising line shall not be used to raise or lower employees unless it is rated for lifting employees.

(vi) Employees must maintain 100% tie-off while moving between the personnel platform and the tower.

(7) Employees being hoisted shall remain in continuous sight of and/or in direct communication with the operator or signal person. The following shall apply:

(a) 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-trunked closed 2-way selective frequency radio systems. When hand signals are used, the employees must use industry standardized hand signals.

(8) Employees shall not be hoisted during adverse weather conditions (high winds, electrical storms, snow, ice, or sleet) or other impending danger, except in the case of emergency employee rescue. The competent person shall make the determination.

(9) 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 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

**R 408.42937 Hoists used for personnel lifting.**

**Rule 2937.** (1) The employer shall ensure that the following requirements used for personnel lifting are met:

(a) The hoist used for personnel lifting shall meet the applicable requirements for design, construction, installation, testing, inspection, maintenance, modification, repair, and operations as prescribed by the manufacturer.

(b) Where manufacturers' specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a registered professional engineer.

(c) 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. 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. Any hoist that has been modified or repaired must be load tested to its rated capacity.

(e) Rated load capacities, recommended operating speeds, and special hazard warnings or instructions shall be conspicuously posted on all hoists.

(f) Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other rotating parts, where exposed, shall be properly guarded.

(g) Personnel load capacity for the current configuration of the gin pole shall be on site and available to the hoist operator.

(h) The hoist shall have an hour meter and a line speed indicator if the unit line speed has the ability to exceed 200 feet per minute. The hoist shall be designed for and must use powered lowering.

(i) 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.

(j) All exhaust pipes shall be guarded where exposed. An accessible fire extinguisher of 5BC rating or higher shall be available at the operator's station.

(k) The hoist shall be serviced and maintained per the manufacturer's or a professional engineer's recommendations.

(l) 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.

(m) 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.

(2) The hoist shall be installed following the manufacturer's mounting procedures according to the following:

(a) To prevent excessive distortion of the hoist base as it is attached to the mounting surface.

(b) Flatness of the mounting surface shall be held to tolerances specified by the hoist manufacturer.

(c) The hoist placement shall have a minimum resistance of at least 2 times the intended load on the job. Anchoring may be necessary to achieve the necessary resistance or to keep the hoist from twisting or turning.

(d) If the hoist is mounted to a truck chassis, it must be properly aligned and all wheels chocked. The hoist placement shall have a minimum resistance of at least 2 times the intended load on the job. Anchoring may be necessary to achieve the necessary resistance or to keep the hoist from twisting or turning.

(3) The hoist drum shall be designed to raise and lower 125% of the rated load of the hoist. All of the following shall apply:

(a) The hoist drum shall have a positive means of attaching the wire rope to the drum.

(b) There shall at all times be at least 3 full wraps of wire rope on the hoist drum when personnel are being hoisted.

(c) During operation, the flange shall be 2 times the wire rope diameter higher than the top layer of wire rope at all times.

(4) Brakes and clutches shall be capable of arresting any over-speed descent of the load. All of the following shall apply:

(a) The hoist shall be provided with a primary brake and at least 1 independent secondary brake, each capable of stopping and holding 125% of the lifting or lowering capacity of the hoist. All of the following shall apply:

(i) 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.

(ii) 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. When a secondary brake is actuated, it shall stop and hold the load in a controlled manner that will not induce shock loading.

(b) Brakes and clutches shall be adjusted, where necessary, to compensate for wear and to maintain adequate force on springs where used. Powered lowering must be used.

(c) 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.

(d) 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. Brakes shall be automatically applied upon return of the control lever to its center (neutral) position.

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

(5) 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. All of the following shall apply:

(a) All controls used during the normal operation of the hoist shall be located within easy reach of the operator at the operator's station.

(b) Controls shall be clearly marked (or be part of a control arrangement diagram) and easily visible from the operator's station. 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.

(c) The controls shall be self-centering controls, for example, "deadman" type, that will return the machine to neutral and engage the drum brakes if the control lever is released.

(6) All wire rope and rigging shall be inspected daily before use. Both of the following shall apply:

(a) All eyes in wire rope slings shall be fabricated with thimbles.

(b) All eyes in wire rope shall be assembled by a qualified person.

(7) 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 1 of the same type, and demonstrated the ability to safely operate the hoist. All of the following shall apply:

(a) The operator shall not operate a hoist when physically or mentally unfit.

(b) The hoist operator shall be responsible for those operations under his/her direct control.

(c) If 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 the following:

(i) The daily inspection has been conducted.

(ii) All controls are in the "off" position.

(iii) All personnel are in the clear.

#### **R 408.42940 Personnel lifting hoist inspections.**

**Rule 2940.** The employer shall ensure that each day before use, a competent person visually inspects all hoists to verify that the following conditions are met:

(a) The manufacturer's guidelines and recommendations are used; however, when not available, the following minimum guidelines shall be used:

(i) A competent person, knowledgeable of hoists, shall complete inspections.

(ii) All repair and inspection records shall be available and accessible for a minimum of 2 years.

(iii) A tear down inspection record shall be available until the next teardown inspection is completed.

(iv) Any hoist that has been idle for a period of over 6 months shall be given an annual inspection.

(v) Any hoist that has an unknown history of repair or maintenance shall have a tear down inspection.

(b) The inspection criteria for a gear and hydraulic oil sample analysis is to evaluate the properties of the oil. The general guidelines are the following:

(i) Hydraulic oil shall conform to ISO Standard 4406, Hydraulic Fluid Power--Fluids--Method for Coding the Level of Contamination by Solid Particles, Second Edition, December 1999, for cleanliness level of 18/16/14.

(ii) Gear oil shall conform to the following gear contaminate guideline:

(A) 100 to 500 ppm normal.

(B) 501 to 800 ppm caution.

(C) 801 and up ppm unacceptable.

(c) A daily inspection shall be performed, which shall include, at a minimum, all of the following:

(i) Engine oil level shall be checked.

(ii) Engine coolant levels shall be checked.

(iii) Check for external oil leaks.

(iv) Hydraulic oil reservoir level shall be checked.

(v) All safety devices and brakes shall be checked to ensure they function properly.

(vi) A visual inspection shall be conducted for loose or missing structural connections.

(d) A semi-annual inspection shall be performed, which shall include, at a minimum, all of the following:

(i) Engine oil level shall be checked.

(ii) Winch oil level shall be checked.

(iii) Engine coolant levels shall be checked.

(iv) System shall be checked for external oil leaks.

(v) Hydraulic oil reservoir level shall be checked.

(vi) All safety devices and brakes shall be tested to ensure they are functioning properly.

(vii) A visual inspection shall be conducted for loose or missing structural connections.

(viii) A complete oil analysis shall be conducted.

- (ix) The winch assembly shall be dynamically tested in both the hoisting and lowering directions while under a load of at least 30% of the hoist lifting capacity.
- (x) The inspection shall be documented in writing and maintained for 2 years.
- (e) An annual inspection shall be performed, which shall include, at a minimum, all of the following:
  - (i) Engine oil levels shall be checked.
  - (ii) Winch oil levels shall be checked.
  - (iii) Engine coolant levels shall be checked.
  - (iv) System shall be checked for external oil leaks.
  - (v) Hydraulic oil reservoir level shall be checked.
  - (vi) All safety devices and brakes shall be tested to assure they are functioning properly.
  - (vii) A visual inspection shall be conducted for loose or missing structural connections.
  - (viii) A complete hydraulic and gear oil analysis shall be conducted.
  - (ix) The winch assembly shall be dynamically tested in both the hoisting and lowering directions while under a load of at least 30% of the hoist lifting capacity.
  - (x) Lubricating oil in the hoist drum shall be changed after testing.
  - (xi) Hydraulic fluid and filter shall be changed after testing.
  - (xii) The annual inspection shall be documented and maintained for 2 years.
- (f) Teardown inspection of the winch assembly shall be performed by a qualified person. The following shall apply:
  - (i) A teardown inspection shall include the hoist being completely disassembled; cleaned and inspected; and replacement of all worn, cracked, corroded, or distorted parts such as pins, bearings, shafts, gears, brake rotors, brake plates, drum, and/or base.
  - (ii) After a teardown inspection, a certificate shall be issued by the inspector/service person effective of the date the hoist is placed back in service. The tag shall identify the hoist mechanism, the inspector, and date of the inspection.
  - (g) Winch assemblies that adhere to the required daily, monthly, semi annually, and yearly inspection criteria, shall conform to the following teardown inspection time frame:
    - (i) Severe duty (applies to those winch assemblies that are used more than 125 hours a month at or near the rated capacity of the hoist) is every 3 years.
    - (ii) Moderate duty (applies to those winch assemblies that are used 50 to 125 hours per month and normally operate at considerably less than the winch assembly rated capacity) is every 5 years.
    - (iii) Infrequent use (applies to those winch assemblies that are used for 50 hours or less per month and normally operate less than the winch assembly rated capacity) is every 7 years.
    - (h) Winch assemblies that do not adhere to the inspection criteria in subdivision (g) of this subrule, shall have a tear down inspection every 3 years.
    - (i) During any inspection, items found that may affect the performance of the unit must be repaired before use.

- (j) Documentation of the inspection shall include, but not be limited to, winch model and serial number, name and employer of repair/inspection technician, date and description of findings, parts replaced, and test results.

**R 408.42943 Gin poles used for personnel lifting.**

**Rule 2943.** The employer shall ensure that gin poles shall meet the following requirements when used for personnel lifting:

- (a) A gin pole used for personnel lifting shall meet the applicable requirements for design, construction, installation, testing, inspection, maintenance, modification, repair, and operations as referenced in the ANSI/TIA-1019 2004 Structural Standards for Steel Gin Poles Used for Installation of Antenna Towers and Antenna Supporting Structures or as prescribed by a professional engineer.
- (b) The following safe working load limits shall be applied for gin pole lifts:
  - (i) Wire rope, sheaves, rotating rooster heads, blocks, etc., used in the gin pole lifting process shall meet the manufacturer's safe working load limits. In addition, and for clarification, each component shall have a nominal breaking strength of no less than 5 times the static load applied. Adequate consideration for inefficiencies such as end fitting losses, D/d ratios, frictional losses, etc., shall be considered. "D" is the diameter of the sheave and "d" is the diameter of the wire rope passing through the sheave.
  - (ii) Wire rope slings, chains, shackles, turnbuckles, links, hooks, etc. used to attach the gin pole to the tower and/or to attach loads to lifting or tagging lines shall not exceed the manufacturer's safe working load limits. In addition, each individual component, as well as an attachment assembly, shall have a nominal breaking strength of not less than 5 times the static load applied. End fitting losses and actual positioning of connecting parts shall be taken into consideration.
  - (iii) Lugs or other devices for lifting or attaching the gin pole in position shall be, at a minimum, designed for the combination of all loads to be applied to the gin pole.
  - (iv) The load factors and factors of safety referenced in this standard are for lifting of loads only. If personnel are to be lifted by a gin pole and its associated equipment, then the complete unit capacity shall be reduced by 1/2.
  - (c) All rigging equipment (cables, slings, shackles, hooks, sockets, and similar equipment) shall be inspected before each use. Defective equipment shall be removed from service.
  - (d) Wire rope used for rigging shall be as follows:
    - (i) Have a steel wire rope core.
    - (ii) The sheave grooves in the rooster head and hoisting blocks shall be compatible with the size of wire rope being used.
    - (iii) The sheave and block diameter shall be of the proper size as referenced by the wire rope manufacturer with a minimum D/d ratio of 18:1. A less than 18:1 D/d ratio may be used if the proper reduction in capacity caused by the reduced diameter is taken into account and a 10:1 safety factor is maintained following the reduction.

(e) End connections shall be terminated per industry and manufacturer specification according to the following:

(i) Wedge sockets have a minimum tail length of 1 rope lay with a properly torqued clip attached to prevent accidental disengagement.

(ii) Only manufactured Flemish eyes will be acceptable.

(iii) Basket slings shall have heavy-duty thimbles in the eyes. An appropriate percentage of strength reduction for wire ropes shall be taken into consideration based upon the end connection type.

(f) Only alloy chains marked with an 8, T, or A, rated for lifting shall be used.

(g) Only quenched and tempered hooks, shackles, and similar equipment shall be used. The manufacturer's load rating shall be stamped on the product.

(h) A gin pole chart shall be provided for each pole and shall contain the following information at a minimum:

(i) Identification number or other reference.

(ii) Gin pole description.

(iii) Overall gin pole length (L).

(iv) Lifting capacities based on gross load.

(v) Cantilever projection ( $L_a$ ) of 20%, 30%, and 40% of the gin pole length.

(vi) Supported by a structure at the bridle and at the basket.

(vii) Load line through the pole not held from horizontal movement (consider as unrestrained).

(viii) Chart minimum load line angle " $\theta$ " in Figure 7.1, which is the same as  $\theta_{\text{cmin}}$  noted in Figure 7.3.

(ix) Type of tag being used.

(x) Straight tag or trolley line angle at grade, alpha ( $\alpha$ ), at 60 degrees from the horizontal.

(xi) Trolley tag line angle, gamma ( $\gamma$ ), attached at pole, usually taken at 2 degrees greater than load line angle.

(xii) A 30 mph effective wind speed at the elevation of the gin pole.

(xiii) Reaction forces at gin pole attachment points.

(xiv) A table to convert degrees to a field measurement (Figure 7.2).

(xv) A warning that the load chart is for lifting loads and instructions to reduce the calculated allowable lifting capacity by 1/2 (50%) when lifting personnel.

Figures 7.1, 7.2, and 7.3 are from the ANSI/TIA-1019 2004 Structural Standards for Steel Gin Poles Used for Installation of Antenna Towers and Antenna Supporting Structures as adopted by reference in R 408.42904.



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