**CHAPTER 32**

**Title: Electrical Safety**

**Issuance Date: 10/10/2019**

**Instruction:**Chapter 32 is a new chapter established to address safety requirements for electrical safety.

**Approving Official:** Katherine M. McCulloch, Associate Director for Administration

1. **Purpose.** This chapter specifies the minimum Occupational Safety and Health Program (OSH Program) electrical safety requirements for the safeguarding of employees, volunteers, and contractors U.S. Geological Survey (USGS) in the performance of official Government duties.  This chapter communicates responsibilities and enhances understanding of electrical safety: national codes, national standards, and local, state, and federal regulations.
2. **Scope.**
3. This chapter applies to:
4. Any employee, volunteer, or contractor who conducts work on electrical components in the performance of official duties.
5. Live parts of electric equipment operating at 50 volts or more.
6. **Authority and References.**
7. 29 Code of Federal Regulations (CFR) 1910, Subpart S, Occupational Safety and Health Standards, Electrical.
8. 29 CFR 1926 Subpart K, Safety and Health Regulations for Construction.
9. 29 CFR 1910.147, Occupational Safety and Health Standards, The control of hazardous energy (lockout/tagout).
10. National Fire Protection Association’s (NFPA) NFPA 70, National Electric Code (NEC).
11. NFPA 70E, Standard for Electrical Safety in the Workplace.
12. ASTM F 1506, Standard Performance Specifications for Flame Retardant Textile Materials for Wearing Apparel for Use by Electric Workers Exposed to Momentary Electric Arc and Related Thermal Hazards.
13. National Institute for Occupational Safety and Health (NIOSH) Guidelines for Controlling Hazardous Energy During Maintenance and Servicing.
14. **Requirements.**
15. *General*.
16. *Facilities*.  Protection of workers begins with careful planning and proper design.  The design of new facilities should conform to industry-recognized engineering design standards.  Existing facilities should have a qualified person evaluate their systems and operations in relation to national codes, national standards, and local, state, and federal regulations to determine if they comply or if a safety problem exists.  If the evaluation determines that an unacceptable risk of exposure to an imminent hazard exists, corrective actions should be initiated, including consideration to bring the systems or operations into compliance with current standards.  In the case of a major renovation of an existing facility, the modification shall comply with current standards.
17. USGS owned facilities.
18. Have an Arc Flash analysis conducted by qualified personnel.  The USGS Office of Management Services can assist in developing a schedule to conduct and maintain the analysis.
19. Electrical panels and components are required to be labeled with the appropriate Arc Flash Hazard level as part of the Arc Flash analysis.  (Note: This is not an all-inclusive list of Arc Flash requirements)

Note: The Arc Flash Hazard Warning Label shall include the following; the first three items apply when an incident energy analysis is performed:

* Available incident energy in cal/cm2 and the working distance, and
* Minimum arc rating of clothing, and
* Required level of PPE

Or

* Highest hazard/risk category (HRC) for the equipment
* Applicable nominal system voltage
* Applicable arc flash boundary

Note: When the HRC method is used the arc flash warning label is to include the highest HRC for the equipment, items a through c do not apply.

1. Ensure that electrical components are in safe working order.  If any deficiencies are identified the hazards must be communicated to the potentially affected workers and corrective actions must be taken to repair or replace the equipment.  Only qualified, authorized and Arc Flash trained personnel may perform work on electrical systems and controls.
2. GSA provided facilities.
3. USGS Management to work with the Facilities Leasing and Management Branch and (or) the respective GSA Building Manager to ensure Electrical Components are in safe working order and that an Arc Flash analysis will be performed prior to any live work being conducted so that qualified and authorized staff will know the hazard level and level of protection required.
4. Leased facilities.
5. USGS Management to work with the Facilities Leasing and Management Branch and Property Lessor to ensure Electrical Components are in safe working order and that an Arc Flash analysis will be performed prior to any live work being conducted so that qualified and authorized staff will know the hazard level and level of protection required.
6. All electrical equipment, components, and conductors shall be approved by a nationally recognized testing laboratory (NRTL) for their intended use.
7. Only qualified and authorized persons, which include persons working under the direct supervision of a qualified person, shall perform electrical repairs.
8. The first consideration for working on any electrical system operating at 50 volts (V) or higher is to place the circuit in an electrically-safe work condition.  Before any electrical maintenance or troubleshooting is performed, sources of hazardous electrical energy shall be placed in an electrically-safe work condition except when it is necessary for troubleshooting, testing, or areas that are infeasible.
9. De-energized (electrically-safe work condition).  All circuits and equipment shall be considered energized until opened, and locked/tagged out (Appendix 32-A, Lockout/Tagout typical minimal lockout procedures) according to an approved procedure and proven de-energized with an approved electrical test instrument known to be in proper working order.  After de-energizing and where possible, the circuit should be challenged in some way (e.g., pressing the start button) to prove hazardous energy has been removed.  Whenever work is to be performed on a de-energized system, the work plan shall also identify and provide for protection against any unplanned contact with exposed energized parts in the vicinity of the work.  When electrical equipment contains sources of stored or mechanical hazardous energy (i.e. thermal, mechanical, pneumatic), these sources shall be blocked or otherwise relieved and locked/tagged out.  (Appendix 32-B, OSHA Self-Inspection Lockout/Tagout Checklist)
10. If energized systems and equipment are not placed into an electrically-safe work condition, qualified and authorized employees performing such tasks as electrical repairs, modifications, demolition, servicing, troubleshooting, and testing on energized electrical systems, parts, and equipment, shall comply with the following:
* Personnel shall not work on energized circuits unless they have the supervisor’s approval and are qualified to do so (Appendix 32-C, Electrical Qualification Certification Form).
* *Training*.  Arc Flash Training is required and must comply with the NFPA 70E Standard to include: Specific hazards associated with electrical energy, safe work practices and procedures necessary to provide protection from electrical hazards associated with jobs or tasks, and identification of relationship between electrical hazards and possible injury.  A qualified person will also be trained in the proper use of special precautionary techniques and in selecting and using the appropriate personal protective equipment (PPE), including arc flash, insulating, and shielding materials, and insulated tool and test equipment.  Finally, a qualified person must have proper training in responding to emergency situations.  If supervision or annual inspections indicate that employees are not complying with the safety-related work practices, retraining, or refresher training, is then required.  Retraining is also required if new technology, equipment types, or changes in processes alter the safe work practices, or if workers must employ safe work practices that are not normally used during regular job duties.  Employees must be retrained at least every three years.  Additionally, for tasks performed less than once a year, retraining is required before the performance of work.  Training must be documented within DOI Talent. Sufficient protection in the form of insulated tools, arc-rated (AR) apparel, insulated protective equipment, or other personal protective equipment (PPE) shall be used as necessary while working on or near exposed energized parts.
* *Tools*.  Live-line tools shall be cleaned and inspected before use and receive a dielectric test whenever their insulating value is suspect.  Tools must be used and maintained in accordance to the manufacture’s recommendations.  A record of the testing of live-line tools shall be maintained.
* *Personal Protective Equipment (PPE).*  Personnel shall wear PPE and protective clothing that is appropriate for safe performance of work.  Personnel shall wear appropriate AR clothing and PPE whenever there is potential exposure to an electrical arc flash.  Required AR clothing shall meet the requirements of ASTM F 1506, Standard Performance Specifications for Flame Retardant Textile Materials for Wearing Apparel for Use by Electric Workers Exposed to Momentary Electric Arc and Related Thermal Hazards.  PPE must be inspected and maintained in accordance with Manufacturer's recommendations and instructions.
* *PPE Inspections, Cleaning, and Testing*.  PPE and protective clothing must be inspected prior to and after use.  Additionally, such inspections shall include a field air test of the gloves used.  Visual inspection shall be performed on hot sticks, grounds, aerial lift equipment and booms, rope, ladders, insulated tools, AR clothing, etc.  Equipment that does not successfully pass visual inspection shall not be used and shall be returned for repair and testing or disposal.

Rubber-insulated PPE issued for use shall receive periodic cleaning and electrical testing in accordance with the requirements of 29 CFR 1910.137 and the appropriate ANSI/ASTM standards.  The intervals of retest for rubber goods issued for service shall not be more than 6 months for gloves, and 12 months for sleeves and blankets.  Gloves or sleeves that have been electrically tested, but not issued for service, shall not be placed into service unless they have been electrically tested within the previous 12 months.  A record of testing of PPE should be maintained according to applicable standards.

AR apparel that becomes contaminated with grease, oil, or flammable liquids or combustible materials should not be used.  The garment manufacturer’s instructions for care and maintenance should be followed.  When AR clothing is cleaned, manufacturer’s instructions should be followed to avoid loss of protection.  When AR clothing is repaired, the same AR materials used to manufacture the AR clothing should be used to repair the garment.

All testing methods, apparatus, and facilities shall meet the applicable ANSI/ASTM standards.  The method used and the results of such tests should be documented and made available for inspection.

Retested rubber-insulated PPE shall be identified to indicate the date of the latest test, or date of retest, in accordance with the appropriate standard cited in 29 CFR 1910.137, Standards on Electrical Protective Equipment.  Manufacturer's recommendations shall be followed on the type of paint or ink to be used.

1. Other work, independent of voltage, that presents a significant shock, arc flash, or arc blast hazard to employees shall be analyzed and appropriate controls provided.
2. All accidents involving electrical safety must be promptly reported as required in SM 445-2-H.7.  All work-related accidents must be investigated and analyzed.  Appropriate action must be taken to minimize future incidents.
3. Appropriate safety features must be included in purchase orders and lease agreements for electrical components and equipment.
4. Fire extinguishers, an AED, and first aid kits must be readily available when performing electrical work.
5. When conducting live electrical work, a buddy system shall be used.
6. A Job Hazard Analysis (JHA) shall be used to document the job tasks that require work on electrical equipment and components.
7. Employees and volunteers have the responsibility to follow safe operating procedures and have the right to decline to perform work they deem to be unsafe.
8. **Responsibilities.**
9. *Director*. Directs establishment of a Bureau safety program through the Designated Agency Safety and Health Official.
10. *Associate and Regional Directors*. Ensure managers and supervisors are accountable for ensuring compliance with electrical safety policy requirements.
11. *Designated Agency Safety and Health Official***.**
12. Exercises the authority of the Director to develop, direct, and manage an effective electrical safety program.
13. Assigns electrical safety policy authority to the Chief, Office of Management Services.
14. *Chief, Office of Management Services*.
15. Assigns electrical safety policy and program oversight responsibilities to the Occupational Safety and Health Program Management Branch.
16. Ensures OMS staff has sufficient authority, resources, and qualifications to effectively support regional and national capabilities electrical safety program needs.
17. Provides cost centers support from the Office of Management Services to communicate and work with the applicable electrical Authority Having Jurisdiction (AHJ) to ensure compliance with the applicable electrical safety requirements; federal, state, and local.  The electrical AHJ may be the electrical inspector, engineer, or equivalent qualified individual for the building (facility).  The AHJ should possess such executive ability as is required for performance of the position and should have thorough knowledge of standard materials and work practices used in the installation, operation, construction, and maintenance of electrical equipment.
18. *Occupational Safety and Health Program Manager.*
19. Establishes and oversees electrical safety policy management.
20. Ensures OMS Occupational Safety and Health Management Branch staff has sufficient authority and resources to effectively support regional and mission areas in the implementation of the electrical safety policy.
21. Ensures the assessment of regional and local implementation of the electrical safety policy every 3 years, in accordance with SM 445-2-H.5, Program Evaluations.
22. Coordinates with respective regional and national programs safety managers to ensure local implementation of the electrical safety policy.
23. Provides opportunity and resources for professional development of staff to ensure continual development of knowledge and skills and to remain current and up-to-date with the advances in the field of occupational safety and health.
24. *Regional and National Programs Safety Managers.*
25. Conduct periodic evaluations of regional and mission areas to determine the effectiveness of electrical safety.  Evaluations must consider the overall electrical safety compliance.  (Appendix D, *OSHA Self-Inspection Electrical Checklist*)
26. Provide assistance to regions, mission areas and Collateral Duty Safety Program Coordinators (CDSPCs) to implement the electrical safety program.  Oversee and coordinate assistance to CDSPCs in determining training needs for program implementation.
27. Evaluate training to determine adequacy, cost effectiveness, and appropriateness in meeting program needs.
28. Review Electrical Safety program documents. (i.e., Electrical Safety written program, Lockout/Tagout Procedures, etc.)
29. *Cost Center Managers and Supervisors.*
30. Establish and implement a local level electrical safety program for employees and volunteers who on with electric equipment operating at 50 volts or more.
31. Identify staff that operate or maintain electrical equipment and require training, ensure they are trained and qualified.
32. Enforce electrical safety requirements to include; contractors, subcontractors, and vendors.
33. Restrict access to Electrical/Mechanical control rooms, labeling the rooms with appropriate signage (i.e., Authorized Personnel Only, Restricted Access).
34. Ensure that approved PPE and clothing is provided, available, and used properly.  Provide training to ensure proper use.
35. Establish, implement, and maintain procedures and practices that ensure safe conduct of electrical work.
36. Ensure that employees are provided a workplace that is free from recognized hazards.
37. *Contracting Officer.* Include electrical safety requirements into contracts that involve live electrical work above 50 volts.  Specifically, state that the contractor’s materials are required to conform to industry-recognized engineering design standards.  Additionally, the contractor is required to comply with 29 CFR, National Electric Code, and NFPA 70E requirements.
38. *Contracting Officer Representatives.* Ensure contractor compliance with applicable requirements in this chapter when the Bureau arranges (via procurement contracts, grants, cooperative agreements, etc.) to have work performed by a contractor or subcontractor that involves electrical work above 50 volts.
39. *Collateral Duty Safety Program Coordinators.*
40. Establish programs to strengthen employee, volunteer, and supervisor awareness of electrical safety policy requirements as detailed within this chapter.
41. Establish inspection programs for all PPE as recommended by the manufacturer.
42. Assist supervisors in the administration of the electrical safety program.
43. Coordinate training requests that deviate from established course requirements with the appropriate full-time safety staff, as applicable, for approval by the Occupational Safety and Health Program Manager.
44. *Employees and Volunteers*.
45. Employees are responsible to comply with occupational safety and health regulations and standards that apply to their own actions and conduct, including immediately reporting to management unsafe and unhealthful conditions.
46. Qualified workers are responsible for avoiding and preventing accidents while performing electrical work, repairs, or troubleshooting electrical equipment.
47. Complete and maintain training as described in 4.A.(5)(a)(i) of this chapter.
48. Employees shall visually inspect PPE and protective clothing prior to use, as well as after any work performed that could have damaged the PPE or apparel.

CHAPTER 32, APPENDIX A

#### **Typical Minimal Lockout Procedures**

#### *General* The following simple lockout procedure is provided to assist employers in developing their procedures so they meet the requirements of this standard. When the energy isolating devices are not lockable, tagout may be used, provided the employer complies with the provisions of the standard which require additional training and more rigorous periodic inspections. When tagout is used and the energy isolating devices are lockable, the employer must provide full employee protection and additional training and more rigorous periodic inspections are required. For more complex systems, more comprehensive procedures may need to be developed, documented, and utilized. Lockout Procedure Lockout Procedure for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Name of Company for single procedure or identification of equipment if multiple procedures are used.)

Purpose

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

Compliance With This Program

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment. Type of compliance enforcement to be taken for violation of the above. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sequence of Lockout

(1) Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Name(s)/Job Title(s) of affected employees and how to notify.

(2) The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Type(s) and magnitude(s) of energy, its hazards and the methods to control the energy.

(3) If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Type(s) and location(s) of machine or equipment operating controls.

(4) De-activate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Type(s) and location(s) of energy isolating devices.

(5) Lock out the energy isolating device(s) with assigned individual lock(s).

(6) Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type(s) of stored energy, methods to dissipate or restrain.

(7) Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or “off” position after verifying the isolation of the equipment.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Method of verifying the isolation of the equipment.

(8) The machine or equipment is now locked out.

Restoring Equipment to Service.

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.

(1) Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.

(2) Check the work area to ensure that all employees have been safely positioned or removed from the area.

(3) Verify that the controls are in neutral.

(4) Remove the lockout devices and reenergize the machine or equipment.

Note: The removal of some forms of blocking may require reenergization of the machine before safe removal.

(5) Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

[54 FR 36687, Sept. 1, 1989 as amended at 54 FR 42498, Oct. 17, 1989; 55 FR 38685, Sept. 20, 1990; 61 FR 5507, Feb. 13, 1996]

CHAPTER 32, APPENDIX B

**OSHA Self-Inspection Lockout/Tagout Checklist**

This checklist is by no means all-inclusive. You should add to them or delete items that do not apply to your tasks; however, carefully consider each item and then make your decision. You should refer to OSHA standards for specific guidance that may apply to your work situation. (Note: These checklists are typical for general industry but not for construction or maritime industries.)

|  |
| --- |
| Is all machinery or equipment capable of movement required to be de-energized or disengaged and blocked or locked out during cleaning, servicing, adjusting, or setting up operations? |
| If the power disconnect for equipment does not also disconnect the electrical control circuit, are the appropriate electrical enclosures identified and is a means provided to ensure that the control circuit can also be disconnected and locked out? |
| Is the locking out of control circuits instead of locking out main power disconnects prohibited? |
| Are all equipment control valve handles provided with a means for locking out? |
| Does the lockout procedure require that stored energy (mechanical, hydraulic, air, etc.) be released or blocked before equipment is locked out for repairs? |
| Are appropriate employees provided with individually keyed personal safety locks? |
| Are employees required to keep personal control of their key(s) while they have safety locks in use? |
| Is it required that only the employee exposed to the hazard can place or remove the safety lock? |
| Is it required that employees check the safety of the lockout by attempting a startup after making sure no one is exposed? |
| Are employees instructed to always push the control circuit stop button prior to re-energizing the main power switch? |
| Is there a means provided to identify any or all employees who are working on locked-out equipment by their locks or accompanying tags? |
| Are a sufficient number of accident prevention signs or tags and safety padlocks provided for any reasonably foreseeable repair emergency? |
| When machine operations, configuration, or size require an operator to leave the control station and part of the machine could move if accidentally activated, is the part required to be separately locked out or blocked? |
| If equipment or lines cannot be shut down, locked out and tagged, is a safe job procedure established and rigidly followed? |

CHAPTER 32, APPENDIX C

#### **Electrical Qualification Certification Form**

I acknowledge that I may be periodically required to conduct work on electrical equipment and components as part of my official duty. I possess the knowledge, skills, and abilities necessary to conduct work on live parts of electric equipment operating at 50 volts or more. (Electrical training mustbe documented and in good standing.) I hereby certify that I am qualified to perform electrical work, and have been trained and am familiar with the following:

1. Safety-related work practices, including hazard identification and analysis, and proper selection, use and care of PPE, that pertain to their respective job assignments.
2. Skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment.
3. Skills and techniques necessary to determine the nominal voltage of exposed energized parts, clearance distances, and the corresponding voltages to which the qualified person might be exposed.
4. Procedures on how to perform electrical jobs safely and properly.
5. How to lockout/tagout energized electrical circuits and equipment safely.
6. Approach distances defined in NFPA 70E.
7. Knowledge to select and use adequately rated test instruments.

Other types of training to be considered for electrical workers should include the following:

1. *National Electrical Code* (NFPA 70);
2. *National Electrical Safety Code* (IEEE/ANSI C2);
3. *Standard for Electrical Safety in the Workplace* (NFPA 70E);
4. Use of personal protective grounds;
5. Work permit and work authorization procedures;
6. Use of Personal Protective Equipment, including proper clothing required for arc flash or arc blast protection; and
7. First-aid, CPR, AED, and methods of release training.

I agree to inform my Supervisor if at any time after signing this certification if I become disqualified or if I have reservations or concerns about any unsafe job task.

Employee Name/Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Supervisor’s Name/Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date Signed:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

CHAPTER 32, APPENDIX D

#### **OSHA Self-Inspection Electrical Checklist**

This checklist is by no means all-inclusive. You should add to them or delete items that do not apply to your tasks; however, carefully consider each item and then make your decision. You should refer to OSHA standards for specific guidance that may apply to your work situation. (Note: These checklists are typical for general industry but not for construction or maritime industries.)

|  |
| --- |
| Do you require compliance with OSHA standards for all contract electrical work? |
| Are all employees required to report any obvious hazard to life or property in connection with electrical equipment or lines as soon as possible? |
| Are employees instructed to make preliminary inspections and/or appropriate tests to determine conditions before starting work on electrical equipment or lines? |
| When electrical equipment or lines are to be serviced, maintained, or adjusted, are necessary switches opened, locked out or tagged, whenever possible? |
| Are portable electrical tools and equipment grounded or of the double insulated type? |
| Are electrical appliances such as vacuum cleaners, polishers, vending machines, etc., grounded? |
| Do extension cords have a grounding conductor? |
| Are ground-fault circuit interrupters installed on each temporary 15 or 20 ampere, 120 volt alternating current (AC) circuit at locations where construction, demolition, modifications, alterations, or excavations are being performed? |
| Are multiple plug adaptors prohibited? |
| Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring? |
| Do you have electrical installations in hazardous dust or vapor areas? If so, do they meet the National Electrical Code (NEC) for hazardous locations? |
| Are exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly? |
| Are flexible cords and cables free of splices or taps? |
| Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, etc., and is the cord jacket securely held in place? |
| Are all cord, cable and raceway connections intact and secure? |
| In wet or damp locations, are electrical tools and equipment appropriate for the use or location or otherwise protected? |
| Is the location of electrical power lines and cables (overhead, underground, under floor, other side of walls, etc.) determined before digging, drilling, or similar work is begun? |
| Are metal measuring tapes, ropes, hand-lines or similar devices with metallic thread woven into the fabric prohibited where they could come in contact with energized parts of equipment or circuit conductors? |
| Is the use of metal ladders prohibited where the ladder or the person using the ladder could come in contact with energized parts of equipment, fixtures, or circuit conductors? |
| Are all disconnecting switches and circuit breakers labeled to indicate their use or equipment served? |
| Are disconnecting means always opened before fuses are replaced? |
| Do all interior wiring systems include provisions for grounding metal parts of electrical raceways, equipment and enclosures? |
| Are all electrical raceways and enclosures securely fastened in place? |
| Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures? |
| Is sufficient access and working space provided and maintained around all electrical equipment to permit ready and safe operations and maintenance? |
| Are all unused openings (including conduit knockouts) in electrical enclosures and fittings closed with appropriate covers, plugs, or plates? |
| Are electrical enclosures such as switches, receptacles, junction boxes, etc., provided with tight-fitting covers or plates? |
| Are disconnecting switches for electrical motors in excess of two horsepower able to open the circuit when the motor is stalled without exploding? (Switches must be horsepower rated equal to or in excess of the motor rating.) |
| Is low voltage protection provided in the control device of motors driving machines or equipment that could cause injury from inadvertent starting? |
| Is each motor disconnecting switch or circuit breaker located within sight of the motor control device? |
| Is each motor located within sight of its controller or is the controller disconnecting means able to be locked open or is a separate disconnecting means installed in the circuit within sight of the motor? |
| Is the controller for each motor that exceeds two horsepower rated equal to or above the rating of the motor it serves? |
| Are employees who regularly work on or around energized electrical equipment or lines instructed in cardiopulmonary resuscitation (CPR)? |
| Are employees prohibited from working alone on energized lines or equipment over 600 volts? |