

PROGRAM DIRECTIVE

Program Directive A-164
Issued January 1, 1992
Revised October 21, 1993

SUBJECT: Electrical Safety

**AFFECTED CODES/
DIRECTIVES:** 1910.331 through .335

PURPOSE: To provide inspection guidelines relating to OR-OSHA's rules addressing work practices and procedures for electrical safety.

BACKGROUND: The standard for Electrical Safety-Related Work Practices was promulgated by Federal OSHA on August 6, 1990, at Federal Register, Vol. 55, No. 151 (pages 31984-32020), and was adopted by OR-OSHA effective April 1, 1991.

1. The current electrical standards in Subpart S of the General Industry Standards cover electrical equipment and installations rather than work practices. The electrical safety-related work practice standards that did exist were distributed in other subparts of 1910. Although unsafe work practices appear to be involved in most workplace electrocutions, OR-OSHA has very few regulations addressing work practices necessary for electrical safety. Because of this, OR-OSHA determined that standards were needed to minimize these hazards.
2. The new rule addresses practices and procedures that are necessary to protect employees working on or near exposed energized and deenergized parts of electric equipment. The new rule also promotes uniformity and reduces redundancy among the general industry standards. The rule is based largely on NFPA 70E, Part II.
3. On March 1, 1990, OR-OSHA promulgated a generic standard on the control of hazardous energy, 1910.147 (lockout/tagout).
 - a. That standard addresses practices and procedures that are necessary to deenergize machinery or equipment and to

prevent the release of potentially hazardous energy while maintenance and servicing activities are being performed.

- b. Although that rule is related to electrical energy, it specifically excludes "exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by Subpart S of 1910." Therefore, the lockout/tagout standard does not cover these electrical hazards.
- c. The final electrical safety-related work practices standard has provisions to achieve maximum safety by deenergizing energized parts and, secondly, when lockout/tagout is used, it is done to ensure that the deenergized state is maintained.

**INSPECTION
GUIDELINES:**

Insofar as possible the compliance officer shall integrate inspection procedures for this standard with those of 1910.147 (lockout/tagout standard).

- 1. The following guidance provides a general framework to assist the compliance officer during all inspections:
 - a. The employer's written procedures required under 1910.333(b)(2)(i) shall be reviewed to determine if they cover the hazards likely to be encountered.
 - (1) A copy of paragraph (b) of 1910.333 maintained by the employer will fulfill this requirement.
 - (2) A copy of the written procedures for locking and tagging required by 1910.147 will also comply with this requirement, provided those procedures address the electrical safety hazards covered by Subpart S and provided the procedures conform to 1910.333(b).
 - (3) If the employer has chosen to utilize procedures developed to comply with 1910.147 for electrical as well as other hazards, the written procedures must include steps corresponding to requirements in Section 1910.333 for application of locks and tags and verification of deenergized conditions (1910.333(b) (2)(iii)(D) and (b)(2)(iv)(B)).
 - b. The training practices of the employer for qualified and

unqualified employees shall be evaluated to assess whether the training provided is appropriate to the tasks being performed or to be performed.

- (1) All employees who face a risk of electric shock, burns or other related injuries, not reduced to a safe level by the installation safety requirements of Subpart S, must be trained in safety-related work practices required by 1910.331-.335.
- (2) In addition to being trained in and familiar with safety related work practices, unqualified employees must be trained in the inherent hazards of electricity, such as high voltages, electric current, arcing, grounding, and lack of guarding. Any electrically related safety practices not specifically addressed by Sections 1910.331 through 1910.335 but necessary for safety in specific workplace conditions shall be included.
- (3) The training of qualified employees must include at the minimum the following:
 - (a) The ability to distinguish exposed live parts from other parts of electric equipment.
 - (b) The ability to determine the nominal voltage of live parts.
 - (c) The knowledge of clearance and/or approach distances specified in 1910.333(c).
- (4) During walkaround inspections, compliance officers shall evaluate any electrical-related work being performed to ascertain conformance with the employer's written procedures as required by 1910.333(b)(2)(i) and all safety-related work practices in Sections 1910.333 through 1910.335. (See (5) Enforcement/ Citation Guidance of this instruction for clarification.)
- (5) Any violations found must be documented adequately, including the actual voltage level.

INTERPRETIVE

GUIDANCE:

The following guidance is provided relative to specific provisions of the standard for Electrical Safety-Related Work Practices:

1. Definitions: Qualified/Unqualified Persons.
 - a. The standard defines a qualified person as one familiar with the construction and operation of the equipment and the hazards involved. "Qualified Persons" are intended to be only those who are well acquainted with and thoroughly conversant in the electric equipment and electrical hazards involved with the work being performed.
 - (1) Whether an employee is considered to be a "qualified person" will depend on various circumstances in the workplace. It is possible and, in fact, likely for an individual to be considered "qualified" with regard to certain equipment in the workplace, but "unqualified" as to other equipment. (See 1910.332(b)(3) for training requirements that specifically apply to qualified persons.) Only qualified persons may place and remove locks and tags.
 - (2) An employee who is undergoing on-the-job training, who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training, and who is under the direct supervision of a qualified person is considered to be a qualified person for the performance of those duties.
 - b. Where the term "may not" is used in these standards, the term bears the same meaning as "shall not."
 - c. Training requirements apply to all employees in occupations that carry a risk of injury due to electrical hazards that are not sufficiently controlled under 1910.303 through 1910.308.
2. Scope/Coverage of the Standard.
 - a. The provisions of the standard cover all employees working on, near or with premises wiring, wiring for connection to supply, other wiring, such as outside conductors on the

premises and optical fiber cable, where the fiber cable installations are made along with electric conductors and the optical fiber cable types are those that contain noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers.

b. The standard does not cover qualified workers (but does cover unqualified workers) performing work on the following:

(1) Electric power generation, transmission, and distribution installations located in buildings used for such purposes or located outdoors.

NOTE: Work on the specified electrical installations is excluded, but work on other electric equipment in the buildings is not excluded.

(2) Communications installations covered under 1910.268.

(3) Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles.

(4) Installations of railways for generation, transformation, transmission, or distribution of electric power used exclusively for operation of rolling stock or installations of railways used exclusively for signaling and communication purposes.

c. The standard for Electrical Safety-Related Work Practices was developed to complement the existing electrical standards. The new standard includes requirements for work performed on or near exposed energized and deenergized parts of electric equipment, use of electrical protective equipment, and the safe use of electrical equipment.

d. Exposure to unexpected electrical energy release that could result in electric shock or burns or in an explosion caused by an electric arc is covered by the standard for Electrical Safety-Related Work Practices. Safeguarding workers from other hazards related to the unexpected release of hazardous

energy during servicing and maintenance operations is covered by 1910.147, the lockout/tagout standard.

- (1) 1910.333(a)(1) requires that live parts be deenergized before a potentially exposed employee works on or near them. OR-OSHA believes that this is the preferred method for protecting employees from electrical hazards. The employer is permitted to allow employees to work on or near exposed live parts only:
 - (a) If the employer can demonstrate that deenergizing introduces additional or increased hazards, or
 - (b) If the employer can demonstrate that deenergizing is infeasible due to equipment design or operational limitations.
- (2) Under 1910.333(a)(2) if the employer does not deenergize (under the conditions permitted in 1910.333(a)(1)), then suitable safe work practices for the conditions under which the work is to be performed shall be included in the written procedures and strictly enforced. These work practices are given in 1910.333(c) and 1910.335.
- (3) Only qualified persons shall be allowed to work on energized parts or equipment.

3. Working on Deenergized Parts.

- a. Circuit parts that cannot be deenergized using the procedures outlined in 1910.333(b)(2) must be treated as energized (as specified in 1910.333 (b)(1)), regardless of whether the parts are, in fact, deenergized.
- b. Deenergized parts are required to be locked and tagged unless exempted under 1910.333(b)(2) (iii)(C) or 1910.333(b)(2)(iii)(E), as discussed below. If so exempted, either a lock or a tag is required.
 - (1) If a tag is used without a lock, it shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by the use of a lock. Examples of

additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

- (2) A lock may be placed without a tag only under the following conditions:
 - (a) Only one circuit or piece of equipment is deenergized, and
 - (b) The lockout period does not extend beyond the work shift, and
 - (c) Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

4. Verification of Deenergization Is Mandatory. This verification must be done by a qualified person.
 - a. The qualified person shall activate the equipment operating controls or otherwise verify that the equipment cannot be restarted.
 - b. Test equipment shall be used to ensure that electrical parts and circuit elements have been deenergized.
 - c. Testing instruments and equipment shall be visually inspected for external defects or damage before being used to determine deenergization (1910.334 (c)(2)).
 - d. For circuits over 600 volts nominal, the test equipment shall be checked for proper operation immediately before and immediately after the test.
5. Reenergization. The following requirements shall be met, in the order given, before circuits or equipment are reenergized, even temporarily.
 - a. A qualified person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed so that the circuits and equipment can be safely energized.

- b. Potentially exposed employees shall be warned to stay clear of circuits and equipment prior to reenergizing.
- c. Each lock and tag shall be removed by the employee who applied it. However, if the employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that the employer ensures:
 - (1) That the employee who applied the lock or tag is not available at the workplace, and
 - (2) That the employee is informed that the lock or tag has been removed before he or she resumes work at the workplace.
 - (3) That there is to be a visual determination that all employees are clear of the circuits and equipment prior to lock and tag removal.

6. Working On or Near Overhead Power Lines, 1910.333(c)(3).

- a. OR-OSHA believes that the preferred method of protecting employees working near overhead power lines is to deenergize and ground the lines when work is to be performed near them.
- b. In addition to other operations, 437-02-306 also applies to tree trimming operations performed by tree workers who are "unqualified persons."
- c. The standard does not prohibit workers who are not "qualified tree workers" from working in a tree that is closer than 10 feet to power lines so long as that person or any object he or she may be using, does not come within 10 feet of a power line. However, it would require "qualified line-clearance tree trimmers" to perform the work if the worker or any object he or she may be using will come within 10 feet of an exposed energized part or if a branch being cut may be expected to come within 10 feet of an exposed energized part while falling from the tree. (See 437-02-306(4).)
- d. The purpose for the approach distance requirements is to prevent contact with, and/or arcing, from energized overhead power lines. The approach distance applies to

tools used by employees as well as the employees themselves. Table S-5 calls for the following approach distances for qualified employees only:

Voltage Range (AC) <u>(phase to phase)</u>	Minimum Approach <u>Distance</u>
300V and less	Avoid contact
Over 300V, not over 750V	1 ft. 0 in. (30.5cm)
Over 750, not over 2kV	1 ft. 6 in. (46cm)
Over 2kV, not over 15kV	2 ft. 0 in. (61cm)
Over 15kV, not over 37kV	3 ft. 0 in. (91cm)
Over 37kV, not over 87.5kV	3 ft. 6 in. (107cm)
Over 87.5kV, not over 121kV	4 ft. 0 in. (122cm)
Over 121kV, not over 140kV	4 ft. 6 in. (137cm)

NOTE: Unqualified employees are required to adhere to the 10 ft. minimum.

- e. Employees working on or around vehicles and mechanical equipment, such as gin-pole trucks, forklifts, cherry pickers, garbage trucks, cranes and elevating platforms, who are potentially exposed to hazards related to equipment component contact with overhead lines, shall have been trained by their employers in the inherent hazards of electricity and means of avoiding exposure to such hazards.
- f. The standard for Electrical Safety-Related Work Practices can be applied with respect to electrical hazards related to any size, utilization or configuration of overhead power lines in general industry; e.g., residential power lines, remotely located overhead power lines, temporarily rigged overhead power lines, and overhead power lines along streets and alleys.

7. Portable Ladders. Such ladders may not have conductive siderails in situations where the employee or the ladder could contact exposed energized parts. All ladders shall be in compliance with requirements of the standards found elsewhere in Part 1910.
8. Conductive Apparel. Articles of jewelry and clothing such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear shall not be worn if there is a possibility of contacting exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means (1910.333(c)(8)).
9. Housekeeping Duties. The employer has the burden to provide adequate safeguards (such as insulating equipment or barriers) where live parts present an electrical contact hazard to employees who are performing housekeeping duties. Electrically conductive cleaning materials (such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.
10. Electrical Safety Interlocks. Interlocks found on panels, covers and guards are designed to deenergize circuits to prevent electric shock to persons using equipment or performing minor maintenance or adjustments and shall not be defeated or bypassed by an unqualified person.
11. Cord- and Plug-Connected Equipment. Energized equipment here means either the equipment being plugged or the receptacle into which it is being plugged, or both (1910.334(a)(5)(i)).
12. Eye and Face Protection. 1910.335(a)(1)(v) requires employees to wear protective equipment for the eyes or face wherever there is danger of injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.
13. Insulated Tool. This means a tool encased within material of composition and thickness that is recognized as electrical insulation.

**ENFORCEMENT/
CITATION GUIDANCE:**

1. A deficiency in the employer's program that could contribute to a potential exposure capable of producing serious physical harm or

death shall be cited as a serious violation.

2. The failure to train "qualified" and "unqualified" employees as required for their respective classifications shall normally be cited as a serious violation.
3. Paperwork deficiencies in the safe work practice program where effective safe work practice procedures are in place shall be cited as other-than-serious.