



ELECTRICAL SAFETY-RELATED WORK PRACTICES

1. PURPOSE

This policy implements proper safety-related work practices for all Okaloosa County employees that as part of their jobs must perform electrical work. It sets forth the safety-related work practices to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits, which are or may be energized.

2. SCOPE

2.1. This policy covers electrical safety-related work practices for both Qualified persons and Unqualified persons (see the definitions below) who are working on, near, or with the following installations:

2.1.1. *Premises Wiring.* Installations of electrical conductors and equipment within or on buildings or other structures, and on other premises such as yards, carnival, parking and other lots and industrial substations;

2.1.2. *Wiring For Connection to Supply.* Installations of conductors that connect to the supply of electricity;

2.1.3. *Other Wiring.* Installations of other outside conductors on the premises

2.1.4. *Optical Fiber Cable.* Installations of optical fiber cable where such installations are made along with electrical conductors; and

2.1.5. *Exposed Energized Parts.* Installations that involve work performed by unqualified person on or near exposed energized parts.

2.2. This policy does not apply to work performed by qualified persons on or directly associated with the following installations:

2.2.1. *Communications Installations.* Installations of communication equipment to the extent that the work is covered under the OSHA standard in 29 CFR 1910.268 (telecommunications).

2.2.2. *Installations In Vehicles.* Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles other than mobile home and recreational vehicles.

- 2.2.3. *Railway Installations.* Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations of railways used exclusively for signaling and communication purposes.
- 2.2.4. *Generation, Transmission and Distribution Installations.* Installations for the generation, control, transformation, transmission, and distribution of electrical energy (including communication and metering) located in buildings used for such purposes or located outdoors, including:
 - 2.2.4.1. Work performed directly on such installations, such as repairing overhead or underground distribution lines or repairing a feed-water pump for the boiler in a generating plant.
 - 2.2.4.2. Work directly associated with such installations, such as line-clearance tree trimming and replacing utility poles.
 - 2.2.4.3. Work on electric utilization circuits in generating plants provided that a. such circuits are commingled with installations of power generation equipment or circuits, and b. the generation equipment or circuits present greater electrical hazards than those posed by the utilization equipment or circuit (such as exposures to higher voltages or lack of over-current protection).
- 2.3. It should be noted that work on or directly associated with installations of utilization equipment used for purposes other than generating, transmitting, or distributing electrical energy (such as installations which are in office buildings, warehouses, garages, machine shops, or recreational buildings or other utilization installations which are not an integral part of a generating installation, substation, or control center) is covered under paragraph above (premises wiring).

3. DEFINITIONS

- 3.1. **Qualified Person** means a person permitted to work on or near exposed energized part who has been trained in and familiar with:
 - 3.1.1. The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment;
 - 3.1.2. The skills and techniques necessary to determine the nominal voltage of exposed live parts;
 - 3.1.3. The knowledge, skills and techniques to work safely on energized circuits.
 - 3.1.4. The proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools; and

- 3.1.5. The clearance distances for work performed ear overhead lines that are specified in the OSHA standard that appears in 29 CFR 1910.333(c) and the corresponding voltages to which he will be exposed.
- 3.2. **Unqualified Person** means a person with little or no training in avoiding the electrical hazards of working on or near exposed energized parts.
- 3.3. **On or Near** means close enough to exposed line parts (by either personal contact or contact by tools or materials) for an employee to be exposed to any hazard they present.

4. **BASIC ELECTRICAL SAFETY**

- 4.1. All electrical equipment should be free from recognized hazards. This should be accomplished by assuring that the proper electrical equipment is selected and that it is maintained in good working condition.
- 4.2. Each electrical disconnect (circuit breaker, etc.) should be legibly marked to indicate its purpose.
- 4.3. All electrical wiring should have the correct polarity. This means that the "hot" and neutral wires must be correctly installed.
- 4.4. All electrical circuits, equipment, and enclosures should have a permanent and continuous path to ground.
- 4.5. Any exposed non-current carrying metal parts of fixed equipment should be grounded in any of the following conditions:
 - within 8 feet vertically or 5 feet horizontally of any grounded objects.
 - in a wet or damp location
 - in electrical contact with metal
 - in a hazardous location
 - when supplied by a metal-clad, metal sheathed, or grounded raceway method
 - when equipment operates at more than 150 volts to ground.
- 4.6. Any exposed non-current carrying metal parts of cord and plug connected equipment must be grounded in any of the following conditions:
 - 4.6.1. in a hazardous location
 - 4.6.2. when operated at over 150 volts to ground
 - 4.6.3. if it is of the following types:
 - refrigerators, freezers, air conditioners
 - clothes washing or drying machines, dishwashing machines, sump pumps, and electrical aquarium equipment
 - hand held motor operated tools

- hedge clippers, lawn mowers, snow blowers, and wet scrubbers
- if used in wet or damp locations, or by employees standing on metal floors or inside metal tanks or boilers
- portable and mobile x-ray and associated equipment
- tools likely to be used in wet and conductive locations
- portable hand lamps

NOTE

Tools that operate at no more than fifty volts and double insulated tools do not require a path to ground. If double insulated tools are used, the equipment must be distinctively marked to indicate that it is double insulated.

- 4.7. Flexible cords and cable should be protected against damage. Sharp corners should be avoided, and cords and cables should not block open doorways or be used where exposed to vehicle traffic.
- 4.8. Conductors entering electrical boxes, etc. should be protected against abrasion.
- 4.9. All openings into electrical boxes, whether used or unused, should be effectively closed.
- 4.10. All pull boxes, junction boxes, and fittings should have approved covers.
- 4.11. Cabinets, cutout boxes, fittings, boxes, and panelboard enclosures in damp or wet locations should be installed in a fashion to keep moisture or water from entering. In wet locations the enclosures should be weatherproof.
- 4.12. Switches, breakers and switchboards in wet locations should be in weatherproof enclosures.
- 4.13. Flexible cords and cables should not be used as a substitute for fixed wiring. Flexible cords and cables should not be run through or behind walls, ceilings, etc., or attached to building surfaces.
- 4.14. Cord and plug connected portable hand lamps should have a molded plastic handle and a substantial guard.
- 4.15. Receptacles in wet or damp locations should be UL listed for that purpose. (Listing by other testing laboratories is acceptable.)
- 4.16. Electrical equipment and wiring in hazardous (classified) locations shall be: intrinsically safe, approved, or safe. NOTE: Hazardous (classified) locations are locations that are subject to the accumulation of flammable or combustible gases, vapors, liquids, dusts, or fibers. These may include but are not limited to: aircraft hangars, gasoline dispensing and service stations, automotive and truck service shops, and health care facilities.

5. ELECTRICAL SAFETY-RELATED WORK PRACTICES OVERVIEW

- 5.1. All employees who face the risk of electrical shock should be trained in electrical safety.

NOTE: This does not apply to employees whose only risk of electrical shock comes from equipment that meets all requirements of the OSHA electrical standards.

- 5.2. In addition to the above training, all qualified persons should be trained in:
- 5.2.1. the skills needed to distinguish exposed live parts from other electrical equipment
 - 5.2.2. the skills needed to determine the nominal voltage of exposed live parts
 - 5.2.3. clearance distances when working near exposed live parts

NOTE: Training may be in a classroom or on the job, as needed.

- 5.3. Live parts should be deenergized before employees work on or near them. Exceptions are allowed if deenergizing introduces increased hazards or if it is infeasible due to equipment design or operational limitations (see section 7.1).
- 5.4. If the exposed parts are not deenergized for the above reasons, other work practices should be used to protect employees.
- 5.5. Deenergized circuits should be locked and tagged.
- 5.6. The employer should have a written lockout procedure for electrical equipment.
- 5.7. A qualified person should check circuits to ensure deenergization.
- 5.8. Only a qualified person should work on equipment that has not been deenergized.
- 5.9. Portable ladders should have nonconductive siderails where the ladder or the employee could contact live parts.
- 5.10. Conductive apparel should not be worn if it might contact exposed live parts. (This may include watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headwear.)
- 5.11. Only a qualified person should be allowed to defeat an interlock, and then only temporarily.
- 5.12. Flexible electric cords should not be used to raise or lower tools or equipment.

- 5.13. Portable cord and plug connected tools and extension cords should be visually inspected before use on each shift.
- 5.14. Damaged tools or cord sets should be taken out of service until repair or replacement.
- 5.15. Employees' hands should not be wet when plugging and unplugging tools and cords.
- 5.16. Employees working in areas where there are potential electrical hazards should be provided with, and use, appropriate electrical protective equipment for the work to be performed.

6. ELECTRICAL WORK IN GENERAL

Appropriate safety-related work practices should be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contact, when work is performed near or on equipment or circuits that are or may be energized. Those specific work practices should be consistent with nature and extent of the associated electrical hazards.

7. WORK ON OR NEAR EXPOSED DEENERGIZED PARTS

- 7.1. Live parts to which an employee may be exposed should be deenergized before any employee works on or near them, unless deenergizing would introduce **additional or increased hazards** or is **infeasible due to equipment design or operational limitations**. See below for example.
 - 7.1.1.1. Live parts that operate at less than 50 volts to ground need not be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.
 - 7.1.1.2. Examples of **increased or additional hazards** include interruption of life support equipment, deactivation of emergency alarm systems, shutdown of hazardous location ventilation equipment, or removal of illumination for an area.
 - 7.1.1.3. Examples of work that may be performed on or near energized circuit parts because of **unfeasibility due to equipment design or operational limitations** include testing of electric circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous industrial process in a chemical plant that would otherwise need to completely shutdown in order to permit work on one circuit or piece of equipment.
- 7.2. Whenever any employee is exposed to contact with parts of fixed electric equipment or circuits that have been deenergized, the circuits energizing the parts should be locked out, or tagged out, or both in accordance with the requirements

of our Energy Control (Lockout/Tagout) Program as supplemented by the requirements of this Policy.

- 7.3. Safe procedures for deenergizing circuits and equipment should be determined before circuits or equipment are deenergized.
- 7.4. The circuits and equipment to be worked on should be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, should not be used as the sole means for deenergizing circuits or equipment. Interlocks for electric equipment should not be used as a substitute for lockout and tagging procedures.
- 7.5. Stored electric energy that might endanger personnel should be released. Capacitors should be discharged and high capacitance elements should be short-circuited and grounded, if the stored electric energy might endanger personnel.
- 7.6. If the capacitors or associated equipment are handled in meeting the foregoing rule, they should be treated as energized.
- 7.7. Stored non-electrical energy in devices that could reenergize electric circuit parts should be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.
- 7.8. A lock and tag should be placed on each disconnecting means used to deenergize circuits and equipment on which work is to be performed, except:
 - 7.8.1. If a lock cannot be applied, or if the tagging procedures will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used without a lock.
 - 7.8.2. A lock without a tag is permissible if all three of the following exist: (i) only one circuit or piece of equipment is energized, (ii) the lockout period does not extend beyond the workshift, and (iii) employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with the procedure.
- 7.9. Whenever a tag is used without a lock as permitted by section 7.8.1 above, it should 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.
- 7.10. Each lock should be attached so as to prevent persons from operating the disconnecting means unless they resort to undue force or the use of tools.
- 7.11. Each tag should contain a statement prohibiting unauthorized operation of the disconnection means and removal of the tag.
- 7.12. No work should be performed on or near deenergized live parts, circuit or equipment until their deenergized condition has been verified.

- 7.13. Verification of the deenergized condition should be made as follows:
- 7.13.1. A qualified person should operate the equipment operating controls or otherwise verify that the equipment cannot be restarted.
 - 7.13.2. A qualified person should use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and should verify that the circuit elements and equipment part are deenergized.
 - 7.13.3. The test should also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfield even though specific parts of the circuit have been deenergized and presumed to be safe.
- 7.14. Before any circuit or equipment is reenergized - even temporarily - the following requirements should be met in the order listed below:
- 7.14.1. A qualified person should 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.
 - 7.14.2. Employees exposed to the hazards associated with reenergizing the circuit or equipment should be warned to stay clear of circuits and equipment.
 - 7.14.3. Each lock and tag should be removed by the employee who applied it or under his or her direct supervision.
 - 7.14.4. If that employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform such task provided that:
 - 7.14.4.1. It is certain that the employee who applied the lock or tag is not available at the workplace, and
 - 7.14.4.2. That employee is made aware that the lock or tag has been removed before he or she resumes work.
 - 7.14.5. There should be a visual determination that all employees are clear of the circuits and equipment.
- 7.15. Conductors and parts of electric equipment that have been deenergized but have not been locked out or tagged in accordance with the foregoing rules should be treated as energized parts, and the requirements listed in the next section of this policy apply to work on or near them.

8. **WORK ON OR NEAR EXPOSED ENERGIZED PARTS**

- 8.1. In those cases where the exposed live parts are not deenergized – either because of increased or additional hazards or because of unfeasibility due to equipment design or operational limitations (see Section 7.1), other safety-related work

practices should be used to protect employees who may be exposed to the electrical hazards involved.

- 8.2. Those work practices should protect employees against contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object or where employees are near enough to be exposed to any hazard they present.
- 8.3. The work practices that are used should be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electrical conductors or circuit parts in accordance with the requirements detailed below.
- 8.4. Only qualified persons should work on electric circuit parts or equipment that has not been deenergized under the procedures listed in the preceding section of this Policy.
- 8.5. Such persons should be capable of working safely on energized circuits and should be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.
- 8.6. Whenever work is to be performed near overhead lines, the lines should be deenergized and grounded, or other protective measures should be provided before work is started.
- 8.7. When overhead lines are to be deenergized, arrangements to deenergize and ground them should be made with the person or organization that operates or controls the electrical circuits involved.
- 8.8. When protective measures are provided such as guarding, isolating, or insulating, those precautions should prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.
- 8.9. No person except a qualified person as defined in this Policy should be permitted to install insulating devices on overhead power transmission or distribution lines.
- 8.10. Whenever an unqualified person is working in an elevated position near overhead lines, the location should be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances:
 - 8.10.1. For voltages to ground 50 kV or below – 10 ft. (305 cm);
 - 8.10.2. For voltages to ground over 50 kV – 10 ft. (305 cm) plus 4 in. (10 cm) for every 10 kV over 50 kV.
- 8.11. Whenever an unqualified person is working on the ground in the vicinity of overhead lines, the person should not bring any conductive object closer to

unguarded, energized overhead lines, than the distances given in paragraph 10, above.

- 8.12. For voltages normally encountered with overhead power lines, objects which do not have an insulating rating for the voltage involved are considered to be conductive.
- 8.13. Whenever a qualified person is working in the vicinity of overhead lines, whether in an elevated position or on the ground, the person should not approach or take any conductive object without an approved insulating handle closer to exposed energized parts than that shown in Tables S-5 of 29 CFR 1910.333 (c) (3) [see paragraph 8.14, below], unless:
- 8.13.1. The person is insulated from the energized part. Gloves, with sleeves if necessary, rated for the voltage involved, are considered to be insulation of the person from the energized part on which work is performed.
- 8.13.2. The energized part is insulated both from all other conductive objects at a different potential and from the person, or
- 8.13.3. The person is insulated from all conductive objects at a potential different from that of the energized part.
- 8.14. The minimum approach distances specified in the said Table S-5 are as follows:

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

- 8.15. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines should be operated so that a clearance of 10 ft. (305 cm) is maintained. IF the voltage is higher than 50kV, the clearance shall be increased 4 in. (10 cm) for every 10kV over that voltage. However, under any of the following conditions the clearance may be reduced:
- 8.15.1. If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. (122 cm). If the voltage is higher than 50kV, the clearance should be increased 4 in. (10 cm) for every 10kV over that voltage.
- 8.15.2. If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

- 8.15.3. If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the uninsulated portion of the aerial lift and the power line) may be reduced to the distance given in said Table S-5 (see paragraph 8.14, above).
- 8.15.4. Employees standing on the ground should not contact the vehicle or mechanical equipment or any of its attachments, unless:
 - 8.15.4.1. The employee is using protective equipment rated for the voltage; or
 - 8.15.4.2. The equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the line than permitted in paragraph number 8.15 above.
- 8.16. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding should not stand at the grounding location whenever there is a possibility of overhead line contact.
- 8.17. Additional precautions, such as the use of barricades or insulation, should be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents that can develop within the first few feet or more outward from the grounding point.
- 8.18. Employees should not enter spaces containing exposed energized parts, unless illumination is provided that enables the employees to perform the work safely.
- 8.19. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees should not perform tasks near exposed energized parts.
- 8.20. Employees must not reach blindly into areas which may contain energized parts.
- 8.21. Whenever an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, he must be provided with, and he should use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with those parts.
- 8.22. Doors, hinged panels, and the like that are present in any confined or enclosed space should be secured to prevent their swinging into an employee and causing the employee to contact exposed energized parts.
- 8.23. Conductive materials and equipment that are in contact with any part of any employee's body should be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts.
- 8.24. Whenever an employee must handle long dimensional conductive objects (such as ducts and pipes) in areas with exposed live parts, appropriate work practices (such as the use of insulation, guarding and material handling techniques) should be instituted which will minimize the hazard.

- 8.25. Portable ladders should have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts.
- 8.26. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) should not be worn if they might contact exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means.
- 8.27. Where live parts present an electrical contact hazard, employees should not perform housekeeping duties at such close distances to the parts that there is a possibility of contact, unless adequate safeguards (such as insulating equipment or barriers) are provided.
- 8.28. Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) should not be used in proximity to energized parts unless appropriate procedures are followed that will prevent electrical contact.
- 8.29. Only a qualified person following the requirements of the procedures set forth in this section of the Policy should defeat an electrical safety interlock and then only temporarily while he or she is working on the equipment.
- 8.30. The interlock system should be returned to its operable condition when such work is completed.

9. **USE OF PORTABLE ELECTRIC EQUIPMENT**

- 9.1. All cord- and plug- connected electric equipment, flexible cord sets (extension cords), and portable electric equipment should be handled in a manner that will not cause damage.
- 9.2. Flexible electric cords connected to equipment should not be used for raising or lowering the equipment.
- 9.3. Flexible cords should not be fastened with staples or otherwise hung in such a fashion as could damage the outer jacket or insulation.
- 9.4. Portable cord- and plug- connected equipment and flexible cord sets (extension cords) should be visually inspected before use on any shift for external defects (such as loose parts, deformed and missing pins, or damage to outer jacket or insulation) and for evidence of possible internal damage (such as pinched or crushed outer jackets). However, cord- and plug- connected equipment and flexible cord sets (extension cords) which remain connected once they are put in place and are not exposed to damage need not be visually inspected until they are relocated.
- 9.5. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item should be removed from service, and no

employee should use it until necessary repair and tests have been made to render the equipment safe.

- 9.6. Whenever an attachment plug is to be connected to a receptacle (including any on a cord set), the relationship of the plug and receptacle contacts should first be checked to ensure that they are proper mating configurations.
- 9.7. A flexible cord used with grounding-type equipment should contain an equipment grounding conductor.
- 9.8. Attachment plugs and receptacles should not be connected or altered in a manner that would prevent proper continuity of the equipment grounding conductor at the point where plugs are attached to receptacles. Additionally, those devices should not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current-carrying conductors.
- 9.9. Adapters that interrupt the continuity of the equipment grounding connection may should be used.
- 9.10. Portable electric equipment and flexible cords used in highly conductive work locations (such as those inundated with water or other conductive liquids), or in job locations where employees are likely to contact water or conductive liquids, should be approved for those locations.
- 9.11. Employees' hands should not be wet when plugging and unplugging flexible cords and cord- and plug- connected equipment, if energized equipment is involved.
- 9.12. Energized plug- and receptacle connections should be handled only with insulating protective equipment if the condition of the connection could provide a conducting path to the employee's hand (if, for example, a cord connector is wet from being immersed in water).
- 9.13. Locking-type connectors should be properly secured after connection.

10. **ELECTRIC POWER AND LIGHTING CIRCUITS**

- 10.1. Load rated switches, circuit breakers, or other devices specifically designed as disconnecting means should be used for the routine opening, reversing, or closing of circuits under load conditions.
- 10.2. Cable connectors not of the load-break type, fuses, terminal lugs, and cable splice connections should not be used for such purposes, except in an emergency.
- 10.3. After a circuit is deenergized by a circuit protective device, the circuit should not be manually reenergized until it has been determined that the equipment and circuit can be safely energized. However, when it can be determined from the design of the circuit and the overcurrent devices involved that the automatic operating of a device was caused by an overload rather than a fault condition, no examination of the circuit or connected equipment is needed before the circuit is reenergized.

- 10.4. Circuit breakers or fuses should not be repetitively reclosed or replaced to reenergize circuits.
- 10.5. Overcurrent protection of circuits and conductors should not be modified, even on a temporary basis, beyond that allowed by the OSHA standard regulating installation safety requirements for overcurrent protection: 29 CFR 1910.304(e).

11. TEST INSTRUMENTS AND EQUIPMENT

- 11.1. Only qualified persons should perform testing work on electric circuits or equipment.
- 11.2. Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors should be visually inspected for external defects and damage before the equipment is used. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item should be removed from service, and no employee may use it until necessary repairs and tests to render the equipment safe have been made.
- 11.3. Test instruments and equipment and their accessories should be rated for the circuits and equipment to which they will be connected and should be designed for the environment in which they will be used.

12. USE OF FLAMMABLE OR IGNITABLE MATERIALS

- 12.1. In those situations where flammable materials are present only occasionally, electric equipment capable of igniting them should not be used, unless measures are taken to prevent hazardous conditions from developing.
- 12.2. Such materials include, but are not limited to: flammable gases, vapors, or liquids; combustible dust; and ignitable fibers or flyings.
- 12.3. In those situations where flammable vapors, liquids, or gases, or combustible dusts or fibers are (or may be) present on a regular bases, the electrical installation requirements contained in the OSHA standard regulating hazardous (classified) locations should be observed. 29 CFR 1910.307.

13. PERSONAL PROTECTION SAFEGUARDS

- 13.1. Employees working in areas where they are potential electrical hazards should be provided with, and should use, electrical protective equipment that is appropriated for the specific parts of the body to be protected and for the work to be performed. Such equipment includes rubber protective equipment such as insulating gloves, blankets, hoods, line hoses, sleeves, and matting for use around electric apparatus. See the OSHA standard on electrical protective devices, 29 CFR 1910.137.

- 13.2. Protective equipment should be maintained in a safe, reliable condition and should be periodically inspected or tested, as required by 1910.137.
- 13.3. If the insulating capability of protective equipment may be subject to damage during use, the insulating material should be protected. (For example, an outer covering of leather when it is used for the protection of rubber insulating material.)
- 13.4. Employees should wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with exposed energized parts.
- 13.5. Employees should wear protective equipment for the eyes or face wherever there is danger or injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.
- 13.6. When working near exposed energized conductors or circuit parts, each employee should use insulated tools or handling equipment if the tools or handling equipment might make contact with such conductors or parts. If the insulating capability of insulated tools or handling equipment is subject to damage, the insulating material shall be protected.
- 13.7. Fuse handling equipment, insulated for the circuit voltage, should be used to remove or install fuses when the fuse terminals are energized.
- 13.8. Ropes and handlines used near exposed energized parts should be nonconductive.
- 13.9. Protective shields, protective barriers, or insulating materials should be used to protect each employee from shock, burns, or other electrically related injuries while that employee is working near exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing might occur.
- 13.10. When normally enclosed live parts are exposed for maintenance or repair, they should be guarded to protect unqualified persons from contact with the live parts.
- 13.11. Alerting techniques should be used to warn and protect employees from hazards which could cause injury due to electric shock, burns, or failure of electric equipment parts as follows:
 - 13.11.1. Safety Signs and Tags. Safety signs, safety symbols, or accident prevention tags should be used where necessary to warn employees about electrical hazards which may endanger them, as required by the OSHA standard on accident prevention signs and tags, 29 CFR 1910.145.
 - 13.11.2. Barricades. Barricades should be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas exposing employees to uninsulated energized conductors or circuit parts. Conductive barricades cannot be used where they might cause an electrical contact hazard.

- 13.11.3. Attendants. If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant should be stationed to warn and protect employees.

14. TRAINING

- 14.1. Appropriate training will be provided for those employee who face a risk of electric shock that is not reduced to a safe level by the OSHA electrical installation requirements specified in 29 CFR 1910.303 through 1910.308.
- 14.2. Electricians and welders always face such a risk and must be provided with appropriate training. That is also true for blue collar supervisors, electrical and electronic engineers, electrical and electronic equipment assemblers, electrical and electronic technicians, industrial machine operators, material handling equipment operators, mechanics and repairers, painters, riggers and roustabouts, and stationary engineers unless their work or the work of those they supervise does not bring them or the employees they supervise close enough to exposed parts of electric circuits operating at 50 volts or more to ground for a hazard to exist.
- 14.3. Each employee required to be trained should be trained in, and should become familiar with, the safety-related work practices required by this Policy or by the OSHA standards in 29 CFR 1910.331 through 1910.335, that pertain to their respective job assignments.
- 14.4. Employees who are covered by paragraph 14.1 of this section (training), but who are not qualified persons should also be trained in and familiar with any electrically related safety practices not specifically addressed by the 1910.331 through 1910.335 OSHA standards but which are necessary for their safety.
- 14.5. Qualified persons (i.e. those permitted to work on or near exposed energized parts) should, at a minimum, be trained in and familiar with the following:
 - 14.5.1. The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment,
 - 14.5.2. The skills and techniques necessary to determine the nominal voltage of exposed parts, and
 - 14.5.3. The clearance distances specified in Table S-5 of 29 CFR 1910.333 (c) [see paragraph 8.14, above] and the corresponding voltages to which the qualified person will be exposed.
- 14.6. The training shall be either classroom, on-the-job, or both.
- 14.7. The degree of training should be determined by the risk likely to be encountered by the employee.