

10.2: Safety-Related Work Practices

Safety-Related Work Practices

Working on live parts

Only qualified persons may work on electrical circuits or parts of equipment that have not been de-energized. Such persons shall be capable of working safely on energized circuits and shall be familiar with the proper use of special equipment PPE and insulating tools and materials.

Guarding

Barriers or other means of guarding shall be provided to ensure that workspace for electrical equipment is not used for passageways during the time energized parts are exposed.

Fuses

Where fuses are installed or removed with one or both terminals energized, only special tools insulated for the voltage shall be used.

Approach distances

Approach distances are the minimum distance that a person and the longest conductive object he or she may contact cannot come in contact with. Approach distances for overhead electrical lines are determined by the voltage of the lines and the qualifications of the persons working near the lines. Approach distances for unqualified persons are:

- For voltages to ground of 50 kV and below - 10 feet
- For voltages to ground over 50 kV - 10 feet plus 4 inches for every 10 kV over 50 kV.
- For qualified persons the following approach distances are required:

Overhead Power line Clearances

Voltage Level	Clearance Distance
For voltages 300V and less	Avoid Contact
For Voltages over 300V but not over 750V	1 ft. 0 in.
For Voltages over 750V but not over 2 kV	1 ft. 6 in.
For Voltages over 2 kV but not over 15 kV	2 ft. 0 in.
For Voltages over 15 kV but not over 37 kV	3 ft. 0 in.
For Voltages over 37 kV but not over 87. 5 kV	3 ft. 6 in.
For Voltages over 87. 5 kV but not over 121 kV	4 ft. 0 in
For Voltages over 121 kV but not over 140 kV	4 ft. 6 in.

Working near overhead lines

Any vehicle or mechanical equipment capable of having parts of its structure elevated near overhead lines shall maintain a minimum working clearance of 10 feet. If the lines operate at a voltage to ground above 50 kV, the distance shall be increased 4 inches for every 10 kV over that voltage. If insulating barriers are installed to prevent contact with the lines, the clearances may be reduced to a distance which is within the working dimensions of the barrier, if the barriers are rated for voltage of the line and the barriers are not part of or an attachment to the vehicle or raised structure.

Flexible cords

Flexible cords connected to equipment shall not be used for raising or lowering the equipment. Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.

Re-energizing circuits

After a circuit is de-energized by a circuit protective device, the circuit may not be manually re-energized until it has been determined that the equipment and circuit can be safely energized.

Illumination

Employees may not enter spaces containing exposed energized parts unless illumination is provided, which permits the employee to work safely.

Confined or enclosed space

Where employees work in a confined or enclosed space, such as a manhole that contains exposed energized parts, the employer shall provide and the employee shall use protective shields, protective barriers, or insulating material as necessary to avoid inadvertent contact with these parts.

Portable ladders

Portable ladders shall have non conductive side rails if they are used where the employee or the ladder could contact exposed energized parts.

Conductive articles

Conductive articles, such as jewelry and clothing, shall not be worn if they might contact exposed energized parts. Such articles may be worn if they are rendered nonconductive by covering, wrapping or other insulating means. This practice is not recommended.

Lockout Tagout

General

When employees are exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits shall be locked or tagged.

Tagging

Controls that are to be deactivated during the course of work on energized equipment or circuits shall be tagged.

Disconnecting circuits

The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as pushbuttons selector switches, and interlocks may not be used as the sole means for de-energizing circuits or equipment.

Stored energy

Stored electrical energy which might endanger personnel shall be released. Capacitors shall be discharged and high-capacitance elements shall be short-circuited and grounded if the energy might endanger personnel.

Rendered inoperative

Circuits shall be rendered inoperative and a tag placed at each point where the equipment or circuit could be energized. The best way to accomplish this is to use a lock and tag on each disconnecting means used to de-energize the equipment and circuits to be worked on. The lock shall prevent the operation of the disconnecting means unless undue force or tools are used. The tags shall contain a statement prohibiting operation of the disconnecting means and removal of the tag.

Tags only

Tags can only be applied if the equipment is not capable of being locked out or if the employer can demonstrate that the tagging procedure will be at least as effective as the use of a lock. When tags are used without locks, at least one additional safety measure, such as opening an extra disconnecting switch, must be taken to assure a level of safety, which is equivalent to that of the locks.

Operating equipment

Prior to beginning work on circuits or equipment that have been tagged or locked out; a qualified person shall operate the equipment operating controls to verify that the equipment is definitely de-energized. In addition a qualified person shall use test

equipment to test the circuit elements and electrical parts to which the employees will be exposed to verify that the equipment is definitely de-energized.

Re-energizing equipment

When equipment that has been locked or tagged out is ready to be reenergized, a qualified person shall conduct tests and visual inspections to verify that all tools, equipment, electrical jumpers or grounds have been removed and the equipment or circuits can be safely re-energized.

Removal of a lock or tag

Tag or lock removal shall only be done by the employee who applied it. If that employee is absent from the workplace, the tag or lock can be removed only after the employer ensures that the employee who applied the tag or lock is not at the jobsite. The employee is aware that the lock or tag has been removed before he or she resumes work, and there is a visual determination that all employees are clear of the circuits and equipment.

Safety-Related Maintenance and Environmental Considerations

Equipment considerations

The employer shall ensure that all wiring and equipment in hazardous locations shall be maintained in a dust-tight, dust-ignition proof, or explosion-proof condition, as appropriate.

Environmental considerations

Unless identified for the use in the operating environment, no conductors or equipment shall be installed in damp or wet locations that are exposed to gases, fumes, vapors, which may have a deteriorating effect or excessive temperature.

Metal raceways, cable armor, boxes, cable sheathing, cabinets, elbows couplings, fittings, supports and support hardware shall be constructed of materials that are appropriate for the environment in which they are to be installed.

Safety Requirements for Special Equipment

Unsealed batteries shall be located in enclosures with outside vents or in well ventilated rooms and shall be arranged so as to prevent the escape of fumes, gases, or electrolyte spray into other areas.

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