

Lockout-Tag out Program



September 2012

I. Introduction

The following Lockout/Tag out program has been instituted by Suffolk County Community College in compliance with the Occupational Safety and Health Administrations (OSHA) federal standards 29 CFR 1910.147. The Purpose of the program is to provide a safe work environment to employees by ensuring the proper procedures are followed during the maintenance and/or repair of equipment that operates using “hazardous energy sources”. This program provides instructions on Lockout/Tag out procedures that must be followed every time the need to isolate equipment from all potential hazardous energy sources is encountered. These procedures require that the machinery or equipment be isolated from its energy source to prevent it from activation during maintenance or repair.

The program will be reviewed at least annually and is located in each effected Department’s Office.

II. Policy

Suffolk County Community College has designated employees as either authorized or affected. Authorized employees are those employees who perform the repair or maintenance on the equipment, thus the employees who are responsible for the locking out or tagging out of the effected equipment. Those individuals that are not listed as authorized employees shall not perform any such work as to which would require the use of the lockout/tag out procedures. They shall, as per College policy, issue a work request to have the appropriately trained personnel perform the work. The following job titles of Suffolk County Community College are authorized employees.

Title
Maintenance Mechanic I-V

Affected employees are those employees who job duties require themselves to be within close proximity to the locked out or tagged out equipment that is being serviced. These employees, although not directly involved in the work being performed or the tagging or locking of equipment, should still be aware of the hazards involved. These employees shall be trained to recognize when hazard control procedures are being implemented, understand the purpose of the program and that they are not to disturb, tamper or interfere with any equipment that is locked or tagged out.

General Guidelines

All power to machinery/equipment shall be disconnected before any maintenance inspection, cleaning, adjusting or servicing (electrical, mechanical or other) that requires entrance in to or close contact with the machinery. The main source of power shall be locked out or blocked off with appropriate locking devices. In the event locking devices are not conducive, appropriate warning tags shall be affixed to the disconnected power line (plug). *Do not attempt to operate any switch, valve, or other energy isolating device where it is locked or tagged out.*

Cord and plug connected equipment and machinery do not require lockout/tag-out procedures as long as the attachment cord and plug has been disconnected and is under the sole control of the individual performing maintenance/repairs.

When all of the following exceptions are met, specific equipment and machinery is not required to have detailed lockout/tag-out procedures:

1. The machine or equipment has no potential for stored or residual energy or re-accumulation of energy after equipment is shut down.
2. Machine or equipment has a single energy source which can be readily identified and isolated.
3. Isolation and locking out of the energy source shall completely de-energize and de-activate the machine or equipment.
4. The machine or equipment is isolated from that energy source and locked out during servicing and maintenance.
5. A single lockout device will achieve a locked out condition (Removal of key or disconnecting power source).
6. The lockout device is under the exclusive control of the authorized employee performing the servicing.
7. The servicing or maintenance does not create hazards for other employees.
8. The Employer in using this exception to the standard has no accidents involving the unexpected activation or re-energization of the equipment during servicing.

III. Lockout Procedures

The manufacturer's instructions will be followed at all times when locking out/unlocking equipment. Specific Standard Operating Procedures (SOP) have been developed for specific pieces of equipment. If a SOP has not been implemented for a piece of equipment, follow the procedure outlined below in conjunction with the manufacturer's instructions.

The following procedure shall be utilized by all authorized employees of Suffolk County Community College when the locking out of equipment/ machinery is necessary.

1. Identify machinery needing repairs and notify supervisor that the equipment will be turned off and locked out
2. Notified all affected individuals you will be locking out equipment
3. Employee shall identify the type and magnitude of the energy that the machine or equipment uses, and shall utilize appropriate methods to control the energy.
4. Equipment should be shut down according to the manufacturer's instructions.
5. Locate power disconnect station.

6. Disconnected power according to procedures noted for machinery
7. Eliminate stored energy, such as capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam or water pressure, etc.
8. With disconnect station in off position, properly affix proper lock device to ensure lockout.
9. With the power disconnect station in off position, push the start button, if machinery starts up, go back to step 3 and repeat procedure thus far. Confirm the power is off with the appropriate meter or instrument.
10. When more than one individual is working on the same machinery, a proper lock device will be provided for each mechanic and keyed separately for each lock.
11. Proceed with repairs.

NOTE: If maintenance will require the authorized employee to perform electrical repairs, maintenance, installation, or disconnection of electrical conductors prior to removing other equipment or machinery, the authorized employee shall test for an energy free state with an electrical testing device (meter).

Working on Live Electrical Equipment

College Employees will not work on live equipment.

Qualified employees must check for electrical de-energization of electrical circuits and equipment by use of an electrical testing device. The test will also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated back feed even though specific parts of the circuit have been de-energized. If the circuit to be tested is over 600 volts (nominal), the test equipment shall be checked for proper operation immediately before and after this test. For these tests, the use of a pocket tester is forbidden.

Qualified Employee- A person designated by Suffolk County Community College as having training, knowledge and experience for the job function.

Additionally electrical lockout tag-out must comply with 29 CFR 1910.333(b), attached as Appendix B to this program.

Restoring Machine or Equipment to Service:

1. When machine or equipment is ready for service, first check equipment or machine and the immediate area around machine to ensure that unnecessary items have been removed and that the machine or equipment components are operationally intact.
2. Ensure all employees have been safely positioned or if necessary removed from the area.
3. Verify that the controls on the machine or equipment are in neutral.
4. Remove the lockout/tag out devices and reenergize the machine or equipment.
5. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

IV. Tag out Procedures

For all machinery/equipment not permanently attached and where a disconnect station is not possible, safety plug locks shall be utilized. The safety plug locks prevent the machinery under repair from being plugged in.

Although tags are appropriate form of hazardous energy control, when locks cannot be utilize, employees should be aware that tags are warning devices and unlike locks, do not provide a physical restraint to prevent startup. Tags are not to be removed except by the person who applied it; they should not be bypassed, ignored or defaced. Tags must be legible, understandable, securely attached to the equipment/machine and must be able to withstand the environmental conditions encountered in the workplace.

The following procedure shall be utilized by all authorized employees of Suffolk County Community College when tagging out of equipment or machinery is necessary.

1. Identify machinery needing repairs and notify unit supervisor that the equipment will be turned off and tagged out
2. Notified all affected individuals you will be tagging out equipment
3. Employee shall identify the type and magnitude of the energy that the machine or equipment uses, and shall utilize appropriate methods to control the energy.
4. Equipment should be shut down according to the manufactures instructions.
5. Locate power line and unplug from main power source
6. Plug into safety plug lock and lock with padlock
7. Affix warning tag to power line at or near plug
8. Sign tag
9. Proceed with repairs

Restoring Machine or Equipment to Service:

Please follow procedure outlined under Section III.

Other Power Sources

When repairing or servicing equipment powered by an energy source other than electricity, the repairperson shall identify the energy source and disconnect from the area under repair, for example steam, water, and gas. In most instances, these power sources are controlled through a series of valves. Therefore:

Locate the control valve and turn off.
Properly attach valve lockout devices and lick
Affix warning tag and sign

Subsequent to all repairs, the locks and warning tags shall be removed and properly discarded.

Removal of Locks or Tags By Other Than Those Who Affix Them:

When the authorized employee who applied the lockout device is not available to remove it, that device may be removed under the direction of the Maintenance Supervisor. The following procedures will be used:

1. Verification by the supervisor that the authorized employee who applied the device is not at the facility.
2. Making all reasonable efforts to contact the authorized employee to inform them that their lockout/tag-out will be removed.
3. Have an authorized employee inspect the equipment to assure the re-energization of the equipment will not expose employees to a hazard or damage the equipment.
4. Insure that the authorized employee is informed that their lock has been removed before they resume work at the facility.

Procedure Involving More Than One Person:

In the preceding steps, if more than one individual is required to lockout and or tag-out equipment, each shall place their personal lockout and or tag-out device on the energy isolating device(s). When an energy isolating device cannot accept multiple locks or tags, a multiple lockout or tag-out device (hasp) shall be used. If lockout is used, a single lock may be used to lockout the machine or equipment with the key being placed in a lockout box or cabinet which allows the use of multiple locks to secure it. Each employee will then use their own lock to secure the box or cabinet. As each person no longer needs to maintain their lockout protection, that person will remove their lock from the box or cabinet.

Basic Rules for Using Lockout or Tag-out System Procedure:

All equipment shall be locked out or tagged out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. **Do not attempt to operate any switch, valve, or other energy isolating device where it is locked or tagged out.**

Outside Personnel (Contractors):

Whenever outside servicing personnel are engaged in operations involving servicing or maintenance of machinery with potentially hazardous energy, the outside employer must inform a representative of the Employer of his/her respective lockout/tag-out procedures. Conversely, the Employer representative must verify that the contractor is complying with all applicable regulations concerning lockout/tag-out (29 CFR 1910.147) while working in the Employer's buildings. Additionally, all affected Employer's personnel will be informed of and instructed to comply with the outside contractor's energy control procedures.

V. Training and Inspections

For proper implementation of this Lockout-Tag out program, employee training and periodic inspections and review of procedures are essential. These two elements are of great importance to maintain and improve the health and safety of all employees, and to promote employee awareness and adherence to the Lockout-Tag out program.

Training

Initial training will be provided to authorized and affected employees upon initial assignment of duties. Retraining will be provided as required (change in job assignments, change in machines, equipment or processes that present a new hazard, or a change in energy control procedures). Retraining will also be provided if periodic inspections warrant it necessary. Suffolk County

Community College will also provide periodic refresher training as it deems necessary. Training records shall include employee names and dates of training, as well as a brief description of topics covered. The training records will be located in the Assistant Director of Public Safety's office.

Inspections

Periodic inspection must be performed at least annually. The purpose of the inspection is to assure that the Lockout/Tag out procedures are being performed properly by appropriate personnel, and that employees are familiar with their responsibilities under the program. The inspection must meet the following requirements:

- Must be performed by an authorized employee, (not involved in the present performance of the lockout/tag out).
- The review must be performed between auditor and each authorized/affected employee concerning their responsibilities under the program. If tag out procedures are being performed then a review of the limitations of tags must also be confirmed with employees.
- Employer must certify the inspection was performed.

Standard Operating Procedure for the performance of the periodic inspection is located in Appendix A.

VI. References

The following information sources were used to complete Suffolk County Community College Lockout/Tag out Program:

- Federal Standard: 29 CFR 1910.147
- Federal Standard: 29CFR1910.147 Appendix A
- OSHA 3120 Guideline *Control of Hazardous Energy*

Appendix A Periodic Inspections

SOP 001 Completion of the Periodic Lockout/Tag out Inspections:

Scope: The following procedure is to be followed by authorized employees upon request by employer to perform the Periodic Lockout/Tag out Inspections. These inspections are mandatory for both procedures if the procedures are use at least once during the year by an authorized employee. Therefore each procedure (lockout and tag out) will be audited at least annually. An authorized employee who is not engaged in the lockout/tag out activity that is being observed must perform the audit.

Procedure:

1. The auditor shall obtain appropriate audit form from the Department.
2. The auditor shall also obtain a copy of the Lockout/Tag out procedure.
3. The auditor will fill in his/her name, the date, and the building/location of the audit.
4. The auditor will also record the type of equipment/machine that is being worked on as well as the names of the employee(s) performing the lockout/tag out procedure.
5. The auditor will then observe the employee(s) while he/she performs the lockout/tag out procedure. The auditor will view the written protocol as the work is being performed.
6. The auditor will then note any nonconformances or errors that were made.
7. The auditor will also note any suggestions for improvements in the program.
8. The auditor will verbally review the procedures for performance of the lockout/tag out program (this will be done whether a error was observed or not).
 - a. If a tag out procedure is being audited then the auditor must also review the limitations of tags.
9. The auditor will then sign the audit form and request that the employee performing the lockout/tag out procedure also sign the audit form.
10. The auditor shall return the form to the Department Office where an Administrator will review the form, sign the form and file the form.

Lockout Audit

Name of Auditor:

Date of Audit:

1. Building/location of audit:

2. Type of equipment/machine lockout procedure is being used for:

3. Name of employee/employees performing lockout procedure:

4. Was the written protocol for lockout followed?

If not why?

5. Any deficiencies or inadequacies in procedure or performance of procedure observed?

If so what?

6. Suggestions of auditor to improve program:

7. As part of inspection the auditor must review with authorized employee his/her responsibilities under the College's lockout procedure. Both auditor and authorized employee must sign below certifying this review was performed.

Auditor:

Authorized Employee:

Audit reviewed by :

Signature:

Date:

Tag out Audit

Name of Auditor:

Date of Audit:

1. Building/location of audit:

2. Type of equipment/machine tag out procedure is being used for:

3. Name of employee/employees performing tag out procedure:

4. Was the written protocol for tag out followed?

If not why?

5. Any deficiencies or inadequacies in procedure or performance of procedure observed?

If so what?

6. Suggestions of auditor to improve program:

7. As part of inspection the auditor must review with authorized employee his/her responsibilities under the College's tag out procedure, including the limitation of tag use. Both auditor and authorized employee must sign below certifying this review was performed.

Auditor:

Authorized Employee:

Audit reviewed by:

Signature:

Date:

APPENDIX B

1910.333 Selection and use of work practices.

1910.333(a)

General. Safety-related work practices shall be employed 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. The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.

1910.333(a)(1)

Deenergized parts. Live parts to which an employee may be exposed shall be deenergized before the employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. 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.

Note 1: 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.

Note 2: Examples of work that may be performed on or near energized circuit parts because of infeasibility 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 be completely shut down in order to permit work on one circuit or piece of equipment.

Note 3: Work on or near deenergized parts is covered by paragraph (b) of this section.

1910.333(a)(2)

Energized parts. If the exposed live parts are not deenergized (i.e., for reasons of increased or additional hazards or infeasibility), other safety-related work practices shall be used to protect employees who may be exposed to the electrical hazards involved. Such work practices shall protect employees against contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts. Specific work practice requirements are detailed in paragraph (c) of this section.

1910.333(b)

Working on or near exposed deenergized parts.

1910.333(b)(1)

Application. This paragraph applies to work on exposed deenergized parts or near enough to them to expose the employee to any electrical hazard they present. Conductors and parts of electric equipment that have been deenergized but have not been locked out or tagged in accordance with paragraph (b) of this section shall be treated as energized parts, and paragraph (c) of this section applies to work on or near them.

1910.333(b)(2)

Lockout and Tagging. While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both in accordance with the requirements of this paragraph. The requirements shall be followed in the order in which they are presented (i.e., paragraph (b)(2)(i) first, then paragraph (b)(2)(ii), etc.).

Note 1: As used in this section, fixed equipment refers to equipment fastened in place or connected by permanent wiring methods.

Note 2: Lockout and tagging procedures that comply with paragraphs (c) through (f) of 1910.147 will also be deemed to comply with paragraph (b)(2) of this section provided that:

[1] The procedures address the electrical safety hazards covered by this Subpart; and

[2] The procedures also incorporate the requirements of paragraphs (b)(2)(iii)(D) and (b)(2)(iv)(B) of this section.

1910.333(b)(2)(i)

Procedures. The employer shall maintain a written copy of the procedures outlined in paragraph (b)(2) and shall make it available for inspection by employees and by the Assistant Secretary of Labor and his or her authorized representatives.

Note: The written procedures may be in the form of a copy of paragraph (b) of this section.

1910.333(b)(2)(ii)

Deenergizing equipment.

1910.333(b)(2)(ii)(A)

Safe procedures for deenergizing circuits and equipment shall be determined before circuits or equipment are deenergized.

1910.333(b)(2)(ii)(B)

The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for deenergizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures.

1910.333(b)(2)(ii)(C)

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

Note: If the capacitors or associated equipment are handled in meeting this requirement, they shall be treated as energized.

1910.333(b)(2)(ii)(D)

Stored non-electrical energy in devices that could reenergize electric circuit parts shall be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.

1910.333(b)(2)(iii)

Application of locks and tags.

1910.333(b)(2)(iii)(A)

A lock and a tag shall be placed on each disconnecting means used to deenergize circuits and equipment on which work is to be performed, except as provided in paragraphs (b)(2)(iii)(C) and (b)(2)(iii)(E) of this section. The lock shall be attached so as to prevent persons from operating the disconnecting means unless they resort to undue force or the use of tools.

1910.333(b)(2)(iii)(B)

Each tag shall contain a statement prohibiting unauthorized operation of the disconnecting means and removal of the tag.

1910.333(b)(2)(iii)(C)

If a lock cannot be applied, or if the employer can demonstrate that 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.

1910.333(b)(2)(iii)(D)

A tag used without a lock, as permitted by paragraph (b)(2)(iii)(C) of this section, shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by 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.

1910.333(b)(2)(iii)(E)

A lock may be placed without a tag only under the following conditions:

1910.333(b)(2)(iii)(E)(1)

Only one circuit or piece of equipment is deenergized, and

1910.333(b)(2)(iii)(E)(2)

The lockout period does not extend beyond the work shift, and

1910.333(b)(2)(iii)(E)(3)

Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

1910.333(b)(2)(iv)

Verification of deenergized condition. The requirements of this paragraph shall be met before any circuits or equipment can be considered and worked as deenergized.

1910.333(b)(2)(iv)(A)

A qualified person shall operate the equipment operating controls or otherwise verify that the equipment cannot be restarted.

1910.333(b)(2)(iv)(B)

A qualified person shall use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are deenergized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been deenergized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately after this test.

1910.333(b)(2)(v)

Reenergizing equipment. These requirements shall be met, in the order given, before circuits or equipment are reenergized, even temporarily.

1910.333(b)(2)(v)(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.

1910.333(b)(2)(v)(B)

Employees exposed to the hazards associated with reenergizing the circuit or equipment shall be warned to stay clear of circuits and equipment.

1910.333(b)(2)(v)(C)

Each lock and tag shall be removed by the employee who applied it or under his or her direct supervision. However, if this 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:

1910.333(b)(2)(v)(C)(1)

The employer ensures that the employee who applied the lock or tag is not available at the workplace, and

1910.333(b)(2)(v)(C)(2)

The employer ensures that the employee is aware that the lock or tag has been removed before he or she resumes work at that workplace.

1910.333(b)(2)(v)(D)

There shall be a visual determination that all employees are clear of the circuits and equipment.

1910.333(c)

Working on or near exposed energized parts.

1910.333(c)(1)

Application. This paragraph applies to work performed on exposed live parts (involving either direct contact or by means of tools or materials) or near enough to them for employees to be exposed to any hazard they present.

1910.333(c)(2)

Work on energized equipment. Only qualified persons may work on electric circuit parts or equipment that have not been deenergized under the procedures of paragraph (b) of this section. Such persons shall be capable of working safely on energized circuits and shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.

1910.333(c)(3)

Overhead lines. If work is to be performed near overhead lines, the lines shall be deenergized and grounded, or other protective measures shall be provided before work is started. If the lines are to be deenergized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to deenergize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

Note: The work practices used by qualified persons installing insulating devices on overhead power transmission or distribution lines are covered by 1910.269 of this Part, not by 1910.332 through 1910.335 of this Part. Under paragraph (c)(2) of this section, unqualified persons are prohibited from performing this type of work.

1910.333(c)(3)(i)

Unqualified persons.

1910.333(c)(3)(i)(A)

When an unqualified person is working in an elevated position near overhead lines, the location shall 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:

1910.333(c)(3)(i)(A)(1)

For voltages to ground 50kV or below - 10 feet (305 cm);

1910.333(c)(3)(i)(A)(2)

For voltages to ground over 50kV - 10 feet (305 cm) plus 4 inches (10 cm) for every 10kV over 50kV.

1910.333(c)(3)(i)(B)

When an unqualified person is working on the ground in the vicinity of overhead lines, the person may not bring any conductive object closer to unguarded, energized overhead lines than the distances given in paragraph (c)(3)(i)(A) of this section.

Note: For voltages normally encountered with overhead power line, objects which do not have an insulating rating for the voltage involved are considered to be conductive.

1910.333(c)(3)(ii)

Qualified persons. When a qualified person is working in the vicinity of overhead lines, whether in an elevated position or on the ground, the person may not approach or take any conductive object without an approved insulating handle closer to exposed energized parts than shown in Table S-5 unless:

1910.333(c)(3)(ii)(A)

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), or

1910.333(c)(3)(ii)(B)

The energized part is insulated both from all other conductive objects at a different potential and from the person, or

1910.333(c)(3)(ii)(C)

The person is insulated from all conductive objects at a potential different from that of the energized part.

TABLE S-5 - APPROACH DISTANCES FOR QUALIFIED EMPLOYEES - ALTERNATING CURRENT

Voltage range (phase to phase)	Minimum approach distance
300V and 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).

1910.333(c)(3)(iii)

Vehicular and mechanical equipment.

1910.333(c)(3)(iii)(A)

Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall 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:

1910.333(c)(3)(iii)(A)(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 shall be increased 4 in. (10 cm) for every 10 kV over that voltage.

1910.333(c)(3)(iii)(A)(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 the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

1910.333(c)(3)(iii)(A)(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 Table S-5.

1910.333(c)(3)(iii)(B)

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

1910.333(c)(3)(iii)(B)(1)

The employee is using protective equipment rated for the voltage; or

1910.333(c)(3)(iii)(B)(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 (c)(3)(iii) of this section.

1910.333(c)(3)(iii)(C)

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 may not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

1910.333(c)(4)

Illumination.

1910.333(c)(4)(i)

Employees may not enter spaces containing exposed energized parts, unless illumination is provided that enables the employees to perform the work safely.

1910.333(c)(4)(ii)

Where lack of illumination or an obstruction precludes observation of the work to be performed, employees may not perform tasks near exposed energized parts. Employees may not reach blindly into areas which may contain energized parts.

1910.333(c)(5)

Confined or enclosed work spaces. When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, the employer shall provide, and the employee shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to contact exposed energized parts.

1910.333(c)(6)

Conductive materials and equipment. Conductive materials and equipment that are in contact with any part of an employee's body shall be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts. If an employee must handle long dimensional conductive objects (such as ducts and pipes) in areas with exposed live parts, the employer shall institute work practices (such as the use of insulation, guarding, and material handling techniques) which will minimize the hazard.

1910.333(c)(7)

Portable ladders. Portable ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts.

1910.333(c)(8)

Conductive apparel. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may 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.

1910.333(c)(9)

Housekeeping duties. Where live parts present an electrical contact hazard, employees may 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. Electrically conductive cleaning materials (including conductive solids 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.

1910.333(c)(10)

Interlocks. Only a qualified person following the requirements of paragraph (c) of this section may defeat an electrical safety interlock, and then only temporarily while he or she is working on the equipment. The interlock system shall be returned to its operable condition when this work is completed.