

SUNY Cobleskill
GUIDE TO CAMPUS ELECTRICAL
SAFETY



BACKGROUND

ELECTRIC SHOCK

It is well known that the human body will conduct electricity, and that if direct contact is made with an electrically energized part while a similar contact is made simultaneously with another conductive surface which is maintained at a different electrical potential, a current will flow, entering the body at one contact point and exiting at another contact point, usually the ground.

Each year, many workers suffer pain, injuries, and death from such electric shocks. OSHA estimates that there are more than 300 electrical fatalities in general industry each year. Burns and "secondary" injuries from collisions and falls are also of concern when working with electricity.

NATURE OF ELECTRICAL ACCIDENTS

Electrical accidents, when studied, often appear to be caused by circumstances which are varied and peculiar to the incidents involved. However, further consideration usually reveals the underlying cause to be a combination of three possible factors: an unsafe environment, unsafe equipment, and unsafe acts. It should also be noted that inadequate maintenance can cause equipment or installations which were originally considered safe to deteriorate, resulting in an unsafe condition.

PROTECTIVE MEASURES

There are various ways of protecting employees from the hazards of electric shock, including insulation and guarding of live parts. Insulation provides an electrical barrier to the flow of current. To be effective, the insulation must be appropriate for the voltage and the insulating material must be undamaged. Equipment grounding is another method of protection from electric shock.

However, even though equipment may be in compliance with installation requirements, personnel may still be exposed to electrical hazards. For example, an employee carrying a ladder could approach exposed live parts guarded by an installation beyond normal reaching distance. The employee's bringing the ladder close to the live parts exposes the worker to hazards greater than those present under usual working conditions.

Another important safety practice involves the use of electrical protective devices, such as rubber gloves and rubber mats for the purpose of insulation against live parts, or live-line tools for purposes of both insulation and manipulation of energized parts from a distance. Regular maintenance of such material is an important consideration in order to keep this equipment from deteriorating into an unsafe condition.

PROCEDURES

Procedures outlined in this program are supplemental, and therefore do not supersede any national, state, and local codes, laws, or regulations.

GENERAL

Live parts to which an employee or student may be exposed shall be deenergized before work is performed on or near them. In certain specific, rare incidents, deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Such cases include, but are not limited to, shutdown of hazardous location ventilation equipment or removal of illumination for a critical area. Such exceptions shall be approved by the Manager Plant Services.

If the exposed live parts are not deenergized (for reasons of increased or additional hazards or infeasibility), then 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.

DE-ENERGIZING CIRCUITS

Conductors and parts of electric equipment that have been de-energized but have not been locked out or tagged out shall be treated as energized parts.

While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out or tagged or both.

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 de-energizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout/tagout.

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 stored electrical energy might endanger personnel.

APPLICATION OF TAGS AND LOCKS

A lock and a tag shall be placed on each disconnecting means used to de-energize circuits and equipment on which work is to be performed, except as provided later in this document. 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.

Each electrician will have his/her own unique lock and key. Although a master key may be available in the maintenance office, it will be used only in the case of emergencies to personnel and property. Routine opening of an electrician's lock under certain circumstances may entail calling the individual back to the campus.

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

If a lock cannot be applied, or if it can be demonstrated that tagging procedures will provide safety equivalent to that of a lock, a tag may be used without a lock. In such cases, the following additional requirements shall be met:

The tags shall be of a distinctive, standardized design that clearly prohibits unauthorized energizing of the circuits and removal of the tag.

A tag may not be used without an additional safety measure such as the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device, or removal of wires from supply at the source.

All persons who have access to controlling devices shall be trained in and familiar with tagging procedures.

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

Only one circuit or piece of equipment is de-energized

AND

The lockout period does not extend beyond the work shift

AND

Affected employees are familiar with this procedure

Verification of the de-energized condition is vital. A qualified person shall operate the equipment operating controls or otherwise verify that the equipment cannot be started. A qualified person shall verify that the circuit elements and equipment parts are de-energized. A determination shall also be made for inadvertently induced or unrelated voltage "backfeed" which can be introduced into the circuit. Shop supervisors will determine qualifications.

RE-ENERGIZING EQUIPMENT

Prior to reenergizing equipment, 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 reenergized. All affected employees shall be notified to stay clear of circuits and equipment. Locks and tags can then be removed after a final visual inspection has been made.

WORKING ON OR NEAR ENERGIZED PARTS

In the case of certain rare and specific instances when employees must work on energized equipment, only qualified individuals may perform such work. These persons must be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.

OVERHEAD LINES

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

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:

For voltages to ground 50 kV or below - 10 feet

For voltages to ground over 50 kV - 10 feet plus 4 inches for every 10 kV over 50 kV

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 the table below unless:

The person is insulated from the energized part (gloves, etc.).

The energized part is insulated from any other conductive object at a different potential and from the person.

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

ALTERNATING CURRENT APPROACH DISTANCES

Voltage range	Maximum approach distance
300V and less	Avoid contact
Over 300V, not over 750V	1 ft. 0 in.
over 750V not over 2kV	1 ft. 6 in.
Over 2kV, not over 15kV	2 ft. 0 in.
Over 15kV, not over 37kV	3 ft. 0 in.
Over 37kV, not over 87.5kV	3 ft. 6 in.
Over 87.5kV, not over 121kV .	4 ft. 0 in
Over 121kV, not over 140kV	4 ft. 6 in.

VEHICULAR AND MECHANICAL EQUIPMENT

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 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 feet.

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 structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance may be reduced to the distance given in the above table.

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless the employee is using protective equipment rated for the voltage.

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.

ILLUMINATION

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

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.

CONFINED OR ENCLOSED WORK SPACES

When working in confined or enclosed spaces (such as manholes or vaults) that contain energized parts, employees shall take precautions (such as the use of protective shields, barriers, or insulating materials) to avoid inadvertent contact with these parts. Doors, hinged panels and the like shall be secured to prevent their swing into an employee and causing the employee to contact exposed energized parts.

The above precautions are supplemental to any and all other guidelines for working in confined spaces such as those regarding the use of respiratory protection. Refer to the College's Confined Space Entry Procedures.

CONDUCTIVE MATERIALS

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 employees handle long dimensional conductive objects such as ducts and pipes in areas with exposed live parts, supervisors will minimize the hazards.

PORTABLE LADDERS

Portable metal ladders and ladders with longitudinal metallic reinforcement may not be used wherever employees might contact exposed energized parts.

CONDUCTIVE APPAREL

Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metal headgear, etc.) may not be worn if they might contact

exposed energized parts. The contact hazard may be eliminated if such articles are rendered nonconductive by covering, wrapping, or other insulating means.

HOUSEKEEPING

"Housekeeping" duties involving conductive cleaning materials (including conductive solids such as steel wool and metalized cloth as well as conductive liquid solutions) shall not be used in the proximity of energized parts unless procedures are followed which will prevent electrical contact.

PORTABLE ELECTRICAL EQUIPMENT

Portable equipment shall be handled in a manner which will not cause damage. Flexible electric cords connected to equipment may not be used for raising or lowering the equipment. Flexible cords may not be fastened with staples or otherwise hung in such a fashion as to damage the outer jacket or insulation.

Portable cord- and plug-connected equipment and flexible cord sets (extension cords) shall be visually inspected before use for external defects such as loose parts, deformed and missing pins, or damage to the outer insulation). If there is a defect or evidence of damage that might expose an employee to injury, no employee may use the defective or damaged item until necessary repairs and tests have been made.

Attachment plugs and receptacles may not be connected or altered in a manner which would prevent proper continuity of the equipment grounding conductor at the point where plugs are attached to receptacles. Additionally, these devices may not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current-carrying conductors.

Adapters which interrupt the continuity of the equipment grounding connection may not be used.

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, shall be approved for those locations. Ground fault protection shall also be provided.

Employees' hands may not be wet when plugging and unplugging flexible cords and associated equipment.

RECLOSING CIRCUITS

After a circuit is deenergized by a circuit protective device, the circuit may not be manually reenergized until it has been determined that the equipment and circuit can be safely reenergized. The repetitive manual reclosing of circuit breakers or reenergizing circuits through replaced fuses is prohibited.

PERSONAL PROTECTIVE EQUIPMENT

Employees working in areas where there are potential electrical hazards shall be provided with electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed. Protective equipment shall be maintained in a safe, reliable condition and shall be periodically inspected or tested. Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with exposed energized parts. Employees shall wear protective equipment for the eyes or face wherever there is a danger of injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.

Fuse handling equipment, ropes, handlines protective shields, protective barriers, and insulated tools shall be used when appropriate to protect employees from exposed energized parts.

ALERTING TECHNIQUES

Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn personnel about electrical hazards which may endanger them. Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas exposing individuals to uninsulated energized circuit parts. Conductive barricades may not be used. If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

POLICY: SUNY Cobleskill Program for the Control of Hazardous Energy

The control of hazardous energy (lockout/tagout) OSHA Regulation 29 CFR 1910.147

As updated by Environmental Health & Safety April 20, 2006

Scope

This program specifically outlines the purpose, authorization, rules, and techniques to be utilized by SUNY Cobleskill employees on a daily basis to guard against the unexpected energizing, start-up, or release of stored energy which could cause injury. It shall be the duty of each employee to become familiar with the contents of this program and ensure compliance with its procedures. Heads of departments shall ensure that employees under their supervision receive training in the contents of this program and ensure records of this training are maintained.

Purpose

The purpose of this program is to establish procedures for affixing appropriate lockout or tagout devices to energy-isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employees.

List of Terms

Affected Employee -An employee whose job requires them to operate or use a machine or piece of equipment on which servicing is being performed under lockout or tagout, or whose job requires them to work in an area in which such servicing or maintenance is being performed.

Authorized Employee- A person who locks or implements a tagout system procedure on machines or equipment to perform the servicing or maintenance on that machine or equipment. An authorized employee and an affected employee may be the same person when the affected employee's duties also include performing maintenance or service on a machine or piece of equipment which must be locked, or a tagout system implemented.

Energy Source-Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Lockout -The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy- isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device- A device that utilizes a positive means, such as a lock, to hold an energy-isolating device in the safe position and prevent the energizing of a machine or piece of equipment.

Normal Production Operations -The utilization of a machine or piece of equipment to perform its intended production function.

Primary Authorized Employee -

The authorized employee who has been vested with responsibility for a set number or group of employees performing service or maintenance on machines or equipment subject to lockout or tagout procedures.

Servicing and/or Maintenance -Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes where the employee may be exposed to the unexpected energization or start-up of the equipment or release of hazardous energy.

Tagout -

The placement of a tagout device on an energy- isolating device, in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Authorizations

A designated SUNY Cobleskill representative may authorize the use of this program by any and all facilities, departments and individuals associated with the control of hazardous energy on any SUNY Cobleskill entity.

Heads of departments will implement the program and ensure that the personnel under their supervision are trained in accordance with the procedures established herein. This responsibility may be delegated to another person or persons within the department providing it is done so in writing and the designated person is qualified and competent. This person will authorize employees to implement the locking and tagging system procedure.

An employee who has been authorized by his or her department head or that department head's designated individual shall lock or implement a tagout system procedure on machines or equipment to perform servicing or maintenance; or on a machine which the unexpected energization or start-up of the machine or equipment, or release of stored energy could cause injury.

Rules

Each department utilizing the SUNY Cobleskill program for the control of hazardous energy shall establish and document site-specific procedures for energy isolation. Specialized lockout devices shall be obtained and kept within the department for its use.

If an energy-isolating device is capable of being locked out, the authorized employee shall utilize lockout, unless the department head or their designated representative can demonstrate that utilization of a tagout system will provide full employee protection. When a tagout device is used on an energy-isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached.

Lockout devices used for the implementation of this program shall be accompanied by a standard tag as suggested by the illustration at left.



These devices shall be used for no other purpose than lockout, and shall be substantial enough to prevent removal without the use of excessive force or unusual techniques. Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

The Manager of Environmental Health & Safety or his/her designated representative shall conduct periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of 29CFR1910.150 (Appendix A) are being followed.

Training

The heads of departments or their designated representatives are required to provide training to ensure that the purpose and function of the energy control program are understood by employees. Through training, employees will be required to possess the knowledge and skills required for safe application, usage, and removal of energy controls. Training shall include the following:

1. Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
2. Each affected employee shall be instructed in the purpose and use of the energy control procedure.
3. All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or re-energize machines or equipment which are locked-out or tagged-out.

When tagout systems are used, employees shall also be trained in the following limitations of tags:

1. Tags are essentially warning devices affixed to energy-isolating devices, and do not provide the physical restraint on those devices that is provided by lockout.
2. When a tag is attached to an energy-isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored or otherwise defeated.
3. Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.
4. Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
5. Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
6. Tags must be securely attached to energy- isolating devices so that they cannot be inadvertently or accidentally detached during use.

Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or process that presents a new hazard, or when there is a change in energy control procedures. Retraining shall establish employee proficiency and introduce new or revised control methods and procedures as necessary. The heads of departments or their designated representatives shall certify that employee training has been accomplished and is being kept up-to-date. The certification shall contain each employee's name and dates of training.

Techniques

Implementation of the lockout or tagout system shall be performed only by authorized employees. Affected employees shall be notified by heads of departments, or their designated representatives, of the application and removal of lockout or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

The established procedure for the application of energy control shall cover the following elements and actions and shall be done in the following sequence:

1. Preparation for shutdown: Before an authorized or affected employee turns off a machine or piece of equipment, they shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

2. Machine or equipment shutdown: An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of equipment de-energization.
3. Machine or equipment isolation: All energy- isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
4. Lockout or tagout device application: Lockout or tagout devices shall be affixed to each energy-isolating device by authorized employees. Lockout devices, where used, shall be affixed in a manner that will hold the energy in a "safe" or "off" position. Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy- isolating devices from the "safe" or "off" position is prohibited.
Where tagout devices are used with energy- isolating devices designed with the capability of being locked, the tag shall be fastened at the same point at which the lock would have been attached.
Where a tag cannot be affixed directly to the energy-isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.
5. Stored Energy: Following the application of lockout or tagout devices to energy-isolating devices, all potentially hazardous stored energy shall be rendered safe. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.
6. Verification of Isolation: Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and de- energization of the machine or equipment has been accomplished.
7. Release from Lockout or Tagout: Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:
 - The Machine or Equipment: The work area shall be inspected to ensure that nonessential items have been removed and that machine or equipment components are operationally intact.
 - Employees: The work area shall be checked to ensure that all employees have been safely positioned or removed. Before lockout or tagout devices are removed and before machines or equipment are energized, affected employees shall be notified.
8. Lockout or Tagout Device Removal: Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device.
Exception: When the authorized employee who applied the lockout or tagout device (installer) is not available to remove it, that device may be removed under the

direction of the installer's immediate supervisor. Specific training and procedures for such removal shall be provided by each department involved in lockout or tagout operations. The procedures and training shall be documented. The documentation shall demonstrate that safety equivalent to the original process of having only the installer remove the device is maintained. The specific procedure shall include at least the following elements:

- Verification by the immediate supervisor that the employee who applied the device is not at the facility,
- Making all reasonable efforts to contact the authorized employee to inform them that his/her lockout or tagout device has been removed, and
- Ensuring that the authorized employee has this knowledge before they resume work at the facility.

9. Testing or Positioning of machines, equipment, or components thereof: In situations where lockout or tagout devices must be temporarily removed from the energy-isolating device and the machine or equipment energized to test or position the equipment or component thereof, the following sequence of actions shall be followed:
 - Clear the machine or equipment of tools and materials.
 - Remove employees from the machine or equipment area.
 - Remove the lockout or tagout devices.
 - Energize and proceed with testing or positioning.
 - De-energize all systems and reapply energy control measures to continue the servicing and/or maintenance.
10. Outside Personnel (contractors, etc.): Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this program, the designated SUNY Cobleskill representative and the outside employer shall inform each other of their respective lockout or tagout procedures. The designated SUNY Cobleskill representative shall ensure that his/her personnel understand and comply with restrictions and prohibitions of the outside employer's energy control procedures. If the outside employer has no documented lockout or tagout procedures, they shall ensure that their personnel understand and comply with the procedures established in this program.
11. Group Lockout or Tagout: When servicing and/or maintenance is performed by a crew or department, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. This shall be accomplished by:
 - The application of a multi-lock accepting device by the primary authorized employee to the energy- isolating device.
 - The primary authorized employee attaching his/her lock to the multi- accepting device.
 - Each authorized employee shall affix a personal lockout or tagout device to the multi-lock accepting device when they begin work, and shall remove those devices when they stop working on the machine or equipment being serviced or maintained.

- The primary authorized employee removing his/her lock and the multi-lock accepting device when all service or maintenance has been completed.

12. Shift or Personnel Changes: To insure the orderly transfer of lockout or tagout devices between off-going and on-coming employees and minimize exposure to hazards from unexpected energization, start-up of the machine or equipment, or release of stored energy, these procedures shall be followed:

- The on-coming personnel shall notify the off-going personnel that they are ready to begin work on the machine or equipment.
- All lockout and/or tagout devices attached to the machine or equipment by the off-going personnel shall be removed and immediately replaced with like devices by the on-coming authorized personnel.
- The primary authorized employee shall insure that all pertinent co-ordination between off-going and on-coming personnel has been completed before the on-coming authorized personnel begin work on the machine or equipment and that all necessary energy has been rendered safe.

THE CONTROL OF HAZARDOUS ENERGY SOURCES (LOCKOUT/TAGOUT)

Page 1 Rev. 0
April 20, 2006
Number of Pages: 5

- 1) Purpose:** The purpose of this policy is to outline procedures that will protect University employees from the unexpected energization, start up or release of stored energy, that could cause injury or death, during servicing or maintenance on machines and equipment.
- 2) Scope:** This policy is for University-wide application.
- 3) Responsibilities:**
- A. The Department of Environmental Health and Safety shall be responsible for:
1. Selecting standardized lockout and tagout devices in compliance with OSHA and distributing to supervisors new locks and tags for new employees and lost equipment.
 2. Designating and arranging for the necessary training of employees who are authorized to perform a lockout or tagout.
 3. Auditing the program, annually in conjunction with the LOTO Committee.
 4. Maintaining training documentation.
- B. Supervisory personnel shall be responsible for:
1. Assuring that only trained and authorized subordinates perform a lockout or tagout. Supervisors shall carefully monitor their employee's compliance with this policy and assure that employees are performing lockouts when necessary.
 2. Maintaining related records (who has been issued locks, who has been trained in their shop).
 3. Removing a lock from service when a key is reported lost.
 4. Notifying EH&S when new employees (or transfers) need initial training.
 5. Notifying EH&S when an employee is in need of retraining.
 6. Notifying EH&S when additional locks and tags are needed.
- C. Employees are responsible for:
1. Implementing a lockout or tagout when necessary and authorized by their supervisor.
 2. Removing locks or tags promptly when work necessitating their installation has been completed.
 3. Reporting the loss of a Lock, tag or key immediately to their supervisor.
 4. Never remove a lock or tag without using this procedure.
 5. If you can not lockout a piece of equipment, notify your supervisor. Only authorized electricians are permitted to perform "live" work.

4) General

All equipment operated by air, electricity, mechanical power, etc. shall be locked out, tagged out or both to protect against accidental or inadvertent operation, when such equipment is being inspected repaired or serviced. No one shall attempt to operate any switch, valve or other energy isolating device that is locked or tagged out.

Each person assigned to work on or around machines or equipment requiring lockout shall place his/her personal lock and tag on the energy isolating device(s). When more than one employee is required to lock out, then a multiple lockout device shall be used. These devices should be obtained through the individuals supervisor or from the EH&S office.

DO NOT OPERATE tags should be used for the temporary labeling of unsafe plugs or cords connected equipment and other situations where lockout is not possible.

Electrical plug lockout devices should be used whenever work is performed on equipment where the safest method of de-energization is to unplug the equipment. Locks and tags are to be used to prevent removal of the plug lockout devices.

5) Exclusions From Coverage

A. hot tap operations including gas, steam, water or petroleum products when continuity of service is essential, shutdown is impractical and documented procedures are followed to provide proven effective protection for employees.

B. When power is needed to find a problem in the system, employees will use good judgment and follow safety procedures.

C. Low voltage DC circuits, such as DC lighting installed in landscaping and DC wiring in the fire alarm system.

6) De-energizing Procedures

The person(s) performing a lockout/tagout shall:

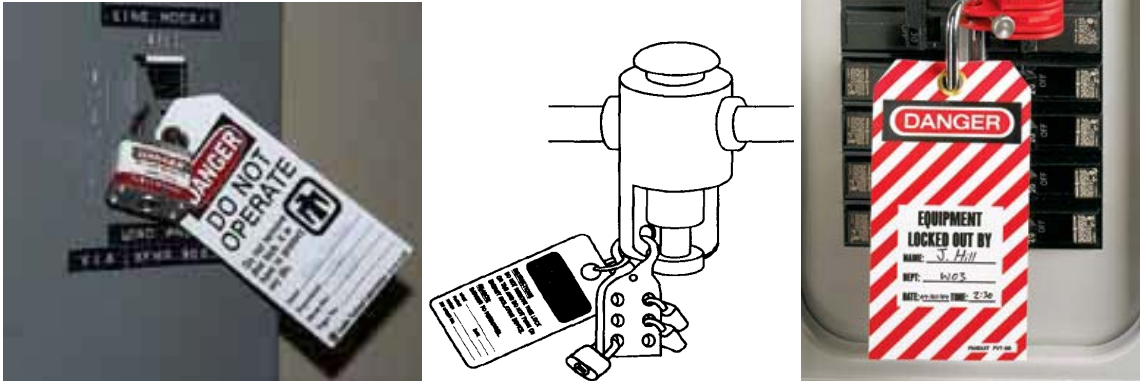
a. Notify all affected employees, any outside contractor working in the area and Power Plant Base that a lockout or tagout system is going to be utilized, the equipment involved and the reason for the lockout. The authorized employee(s) shall know the type and magnitude of energy the machine/equipment utilizes and shall understand the hazards thereof.

b. If the machine or equipment is operating, shut it down by normal stopping procedures (stop button, toggle switch, etc.).

c. Locate all points of energy distribution.

d. Operate the switch valve or other energy isolating device(s) to the off or closed position so that the equipment's isolated from the energy source(s). Stored energy (such as in capacitors, springs, elevated machine members, rotating flywheels, hydraulic system and air, gas, steam or water pressure, etc.) shall be dissipated or restrained by a method such as repositioning, blocking, bleeding down, etc..

e. Lockout and/or tagout the energy isolating devices with assigned personal lock(s) or tag(s).



f. After ensuring that no personnel are exposed, and as a check on de-energized sources, operate the push button(s) or other normal operating controls to make certain the equipment will not operate. When working on electrical circuitry, test for de-energization with a meter.

Caution: Return operating control(s) to "neutral" or "off" position after the test.

g. The equipment is now de-energized.

7) Restoring Machines or Equipment to Normal Operations

- After the servicing/maintenance or repair work is complete, remove all tools, and reinstall any guards.
- Check the work area around the equipment or machine. Make sure the area is policed and all other employees are clear.
- Remove all tags and locks. Remember - each person must remove their own tag/lock.
- Equipment may now be started.
- Inform Power Plant Base that the LOTO has ended.

8) Shift or Personnel Changes

When work necessitating a lockout / tagout is not completed on a given shift and work continues into a succeeding shift, personnel leaving work will remove their locks and tags, and those beginning shift will replace them with their own locks and tags. Supervisory personnel shall closely monitor this process and, if necessary, install their own lock and tag to prevent the possibility of energization of equipment.

9) When It Is Necessary to Leave a Job Incomplete

Physical Plant personnel who find it necessary to leave a job incomplete and still in need of lockout/tagout, shall arrange to have their supervisor install a shop lock and tag, prior to removal of their personnel lock. The supervisor is then responsible for maintaining the lockout/tagout.

10) Failure to Remove a Lockout/Tagout Device

Only the employee who installs a lock or tag shall remove that lock or tag. However, in the event of an emergency, where the employee is not available, the supervisor may cut the lock/tag providing he/she verifies that:

- a. The employee who installed the lock/tag is not at the facility.
- b. All reasonable efforts are made to contact the employee to inform him/her

that his/her lock and /or tagout device needs to be removed.

- c. The employee is informed of such removal before he or she returns to work at the facility by checking the lockout log book in the Power Plant before the day's shift ends.

11) Outside Contractors

A. Whenever outside servicing personnel are engaged in activities covered by the scope and application of this policy, the outside employer and the University shall inform each other of their respective lockout or tagout procedures, during the pre-job stage.

B. The University shall ensure that its personnel understand and comply with restrictions of the outside employers energy control plan.

12) Work on Energized Circuits

The following section applies to working on "live" circuits. Where employees are required to work on "live" electrical circuits, they shall follow the procedures as outlined here.

When work must be performed on "live" electrical circuits, the employee shall notify the supervisor. The supervisor shall verify the necessity for "live" work, and if live work is deemed absolutely necessary, shall follow the procedures listed below.

A. "Live" work may not be performed in areas classified as hazardous by the National Electrical Code*.

B. Employees shall remove finger rings and all other metal or loose fitting jewelry before working on any live equipment.

C. Only circuits of 227V or less are to be worked on "live", and this work shall be performed by authorized, qualified electricians only.

D. All adjacent conductors shall be protected by insulating blankets. Conducting services through which the employee might contact ground shall be protected with approved rubber (or equivalent) insulation.

E. There shall always be an employee at the job site to act as standby when electricians work on dangerous equipment. The standby shall know the location of switches that de-energize the circuit(s) being worked on, or those nearby.

F. Rubber gloves (rated above the working voltage) with leather protectors shall be worn by both the electrician and standby.

G. The electrician shall test to ensure that:

- a. The "live" circuit is carrying the correct voltage.
- b. The work to be performed will not energize any equipment loads.
- c. The feeders to be tied in are free of ground faults and shall have no electrical load.

13) Consequences

Unauthorized removal, disabling, ignoring or tampering with Lockout/Tagout locks or tags:

- can endanger lives, and
- may result in disciplinary action