

## UNIVERSITY SAFETY OFFICE

### **SUBJECT: Control of Hazardous Energy – Lock-Out/Tag-Out**

#### I. PURPOSE AND SCOPE

The purpose of this procedure is to establish uniform methods for disabling powered equipment, machinery, and electrical circuits prior to the performance of inspections, maintenance, or repairs. The procedure shall apply to any source of mechanical, hydraulic, pneumatic, electrical, electromagnetic, chemical, thermal, radiation, or other energy. This includes electrical circuit breakers and/or switches, power source controls to air, water, steam or hydraulic valves, and other devices controlling the operation of equipment.

#### II. APPLICATION

This standard applies to the control of energy during servicing and/or maintenance of machines and equipment.

Normal production operations are not covered by this standard. Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if:

- A. The employee is required to remove or bypass a guard or other safety device; or
- B. An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

#### III. EXCEPTIONS

This standard does not apply to the following:

- A. Work on cord and plug connected electric equipment when exposure to hazardous energy or start up of the equipment is controlled by the unplugging of the equipment from the energy source and the plug is under the exclusive and continual control of the employee performing the service or maintenance.
- B. Minor tool changes and adjustments, and other minor servicing activities, which take place during normal operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for operation, provided that the work is performed using alternative measures which provide effective protection.
- C. Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that continuity of service is essential;

shutdown of the system is impractical; and documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

#### IV. RESPONSIBILITY

All departments which assign employees to service, maintenance, and repair activities are also responsible to protect employees from the unintentional release of hazardous energy. In addition, outside contractors shall adhere to lockout-tagout procedures, based on this procedure or their own; whichever is more stringent, while performing services for the University.

- A. Supervisors shall be provided with either direct or indirect assistance/support from senior management, as necessary, to carry out the duties and responsibilities as follows.
  - 1. Supervisors shall be responsible for safeguarding their service employees from the unintentional release of hazardous energy through the use of lockout/tagout devices.
  - 2. Supervisors shall be responsible for ensuring that employees performing any operation on energized equipment in their area shall comply with the provisions of the lockout/tagout procedure. This includes servicing, adjusting, checkout, clearing jams, cleaning operations, etc. Anytime an employee is required to remove or bypass a guard or other safety device, senior management must be directly involved in the decision to do so.
  - 3. Supervisors shall be responsible for maintaining a supply of lockout/blanking devices, padlocks, tags etc. Locks shall be obtained through the Lock shop.
  - 4. The supervisor or authorized employee shall notify affected employees 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.
- B. Employee(s)
  - 1. Employees shall be responsible for complying with the requirements set forth in this procedure and in departmental guidelines.
  - 2. Implementation of lockout or the tagout system shall be performed only by authorized employees.
- C. University Safety Coordinator has the responsibility of providing assistance with operational and hazard assessments, departmental operational guidelines and training program development, annual and routine inspections, and with the actual hands-on training of University employees. The Safety Coordinator shall review this program every two years, on or before June 1.

#### V. DEFINITIONS

- A. Affected Employee: An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under

lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

- B. Authorized Employee: A person who locks or implements a tagout procedure on machines or equipment to perform service 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 equipment which must be locked or a tagout system implemented.
- C. Blanking: The physical disconnection of process flow piping, e.g., lines containing air, water, steam, oil, chemicals, etc., and the application of caps, plugs, blind flanges, etc., to positively prevent the flow of material.
- D. "Capable of being locked out": An energy isolating device will be considered to be capable of being locked out either if it is designed with a hasp or other attachment or integral part to which, or through which, a lock can be affixed, or if it has a locking mechanism built into it. Other energy isolating devices will also be considered to be capable of being locked out if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.
- E. Emergency Repairs: Repairs needed in critical operations where an accident or failure to complete the operation would result in any of the following:
  - 1. Loss of life or serious injury to employees.
  - 2. Loss of function of a facility.
  - 3. Serious interference or stoppage of contract performance.
  - 4. Loss of high value end items, parts, or tooling.
- F. Energized: Connected to an energy source or containing residual or stored energy.
- G. Energy Isolating Device: A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a disconnect switch; a slide gate; a slip blind; a line valve; a block; and any similar device used to block or isolate energy. The term does not include a push button, selector switch, and other control circuit type devices.
- H. Energy Source: Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- I. Hot Tap: A procedure used in the repair, maintenance and service activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections, instruments or equipment. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

- J. Lockout: The placement of a lockout device on an energy source, ensuring that the equipment cannot be operated until the lockout device is removed.
- K. Lockout Device: A device utilizing a positive means such as a lock to render switches, valves, equipment, etc. inoperable and preventing the energizing of a machine or equipment.
- L. Normal Production Operations: The utilization of a machine or equipment to perform its intended production function.
- M. Other Employee: An employee whose work operations is or may be in an area where energy control procedures may be utilized.
- N. Powered Equipment: Equipment which is activated, operated or moved by electricity, air, hydraulics, compressed springs, etc.
- O. Servicing and/or Maintenance: Work place activities such as constructing, installing, modifying, and maintaining and /or servicing machines or equipment. These activities include lubrication, cleaning or un-jamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to hazardous energy.
- P. Setting Up: Any work performed to prepare a machine or equipment to perform its normal production operation.
- Q. Tagout: The placement of a tagout device at the control area of an electrical circuit, utility line, valve, machinery, equipment, etc., indicating that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- R. Tagout Device: A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device to indicate that the energy being controlled, may not be operated until the tagout device is removed.

## VI. GENERAL REQUIREMENTS

- A. Only employees or contractors who meet the criteria identified in the Training section of this policy may implement a LO/TO procedure.
- B. Lockout/tagout devices shall be used whenever any person is working on systems where unexpected energizing could present a hazard. In cases where more than one individual is needed to work on equipment, each person working on the equipment will attach a padlock or tag to a multiple lockout device.
- C. Departments shall supply all lockout/tagout materials including locks, multiple lockout clamping devices, tags, blanking devices, etc.
- D. Tagout devices shall indicate the identity of the employee(s) working on the equipment and the date the lockout/tagout was applied.

E. Lockout devices and tagout devices shall be singularly identified; shall be the only device(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:

F. Durable

1. Lockout and tagout services shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
2. Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
3. Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

G. Standardized

Lockout and tagout devices shall be standardized. Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.

H. Substantial

1. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.
2. 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.

I. Locks shall be issued to a specific person and keyed individually. Employees assigned locks for lock out shall have their initials or other identifying mark, stamped on to the lock. Locks shall be color-coded to indicate department and craft/shop. Locks shall be color-coded in this manner:

1. Electrical – Blue
2. Plumbing – Green
3. HVAC – White
4. Physical Plant Administration – Red; i.e. Safety Coordinator, Project Coordinators, etc.
5. Residence Life shall follow this color coding and shall have a black band on the lock.

- J. The tagout process shall only be used in cases where there is no other means of lockout and when approved by affected craft supervision and the Safety Coordinator.
- K. Emergency repairs may be necessary on energized circuits or active pipe lines in critical operation where alternate power sources are not available or where the desired results cannot be accomplished with deactivated circuits. In such cases, approval shall be obtained from all supervisory personnel involved and the Safety Coordinator before repairs are made.
- L. Steam lines that cannot be valved off and locked out must be disconnected, properly tagged, and a solid blank installed on the supply line side.
- M. Lines containing chemicals that are flammable, corrosive, toxic or reactive must be valved off, locked and tagged, drained, purged with water, steam or nitrogen. A blind flange should be installed when possible.
- N. Areas shall be roped off and/or adequately posted with "Warning" signs where maintenance or construction work is being performed that could be hazardous to a passerby.
- O. Unauthorized persons entering roped off areas will be subject to disciplinary action. Incidents should be reported to appropriate management who should report the violation to the individual's supervisor and the Safety Office.
- P. Persons performing work requiring lockout or tagout shall notify their supervisor immediately if they have problems complying with this procedure.
- Q. Facilities engineering shall include effective lockout provisions, i.e., machines to be designed to accept a lockout device, etc., whenever major replacement, repair, renovation, or modification of machines or equipment is performed.
- R. Persons found in violation of this policy shall be subject to disciplinary action.

## VII. APPLICATION OF ENERGY CONTROL

- A. Notify all affected employees that a LO/TO system is going to be utilized and the reason thereof. The authorized employee shall know the type and magnitude of energy that the machine or equipment utilizes and shall understand the hazards thereof.
- B. If the machine or equipment is operating, shut it down by the normal stopping procedure (Depress stop button, open toggle switch, etc.).
- C. Operate the switch, valve, or other energy isolating device(s) so that the equipment is isolated from its energy sources. Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas steam, or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc. (Type(s) of stored energy - methods to dissipate or restrain).

- D. Lockout and tagout the energy isolating devices with assigned individual lock(s) and tag(s) (Method(s) selected, i.e., locks, tags, additional safety measures, etc.).
- E. After ensuring that no personnel are exposed, and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate.
- F. CAUTION: Return operating control(s) to "neutral" or "off" position after the test (de-energized state).
- G. The equipment is now locked out.

## VIII. RELEASE FROM LOCKOUT / TAGOUT

Before lockout or tagout devices are removed and energy is restored to the machine or equipment, guidelines shall be followed and actions taken by the authorized employee(s) to ensure the following:

- A. The Machine or Equipment: The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
- B. Employees:
  - 1. The work area shall be checked to ensure that all employees have been safely positioned or removed.
  - 2. Before lockout or tagout devices are removed and before machines or equipment are energized, affected employees shall be notified that the lockout or tagout devices have been removed.
- C. Lockout or Tagout Devices 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 is not available to remove it, that device may be removed under the direction of the department, provided that specific guidelines and training for such removal have been developed, documented and incorporated into the department's energy control program. The department shall demonstrate that the specific guideline provides equivalent safety to the removal of the device by the authorized employee who applied it. The specific guideline shall include at least the following elements:

- 1. Verification by the department that the authorized employee who applied the device has left the facility.
- 2. Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed.
- 3. Ensuring that the authorized employee has this knowledge before he/she resumes work at the facility.

## IX. TRAINING

Shops and departments shall provide training, with the assistance and approval of the Safety Office, for "authorized", "affected", and "other" employees. Such training shall be documented with the employee's name and dates of training and shall include:

- A. 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.
- B. Each affected employee shall be instructed in the purpose and the use of the energy control procedures.
- C. 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 prohibitions relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.
- D. When tag out 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 a lock.
  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.
- E. Employee retraining shall be the responsibility of the shop or department, with the assistance of Safety Office, and shall consist of the following:
  1. 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



processes that present a new hazard, or when there is a change in the energy control procedures.

2. Additional retraining shall also be conducted whenever periodic inspection reveals, or whenever the department has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.
3. The retraining shall reestablish employee proficiency and introduce new or revised control methods and guidelines as necessary.

## X. ADDITIONAL REQUIREMENTS

### A. TESTING OR POSITIONING OF MACHINES, EQUIPMENT OR COMPONENTS

In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

1. Clear the machine of tools and materials.
2. Remove employees from the machine or equipment area.
3. Remove the lockout / tagout devices.
4. Energize and proceed with testing or positioning.
5. De-energize all systems and reapply energy control measures in order to continue servicing and/or maintenance.

### B. OUTSIDE PERSONNEL (CONTRACTORS, ETC.)

1. Whenever contract personnel are to be engaged in activities covered by the Energy Control - Lockout/Tagout procedure, the on-site department and the outside employer shall inform each other of their respective lockout or tagout procedures and/or guidelines.
2. The contractor shall be required to follow and participate in SHSU's LO/TO procedure when the contractor may be exposed to hazardous energy.
3. The contractor shall be required to supply their own locks and the locks should have the identity of the contractor on the lock.

### C. GROUP LOCKOUT OR TAGOUT

1. When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a guideline which affords the employee a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

2. Group lockout or tagout devices shall be used in accordance with the Departmental Energy Control guidelines including, but not necessarily limited to the following specific requirements:

- a) Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);
- b) Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment and
- c) When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee estimated to coordinate affected work forces and ensure continuity of protection; and
- d) Each authorized employee shall affix a personal lockout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

#### D. SHIFT OR PERSONNEL CHANGES

Specific guidelines shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provisions for the orderly transfer of lockout or tagout devices between off-going and oncoming employees to minimize exposure to hazards from the unexpected hazardous energy, start-up of the machinery or equipment, or release of stored energy.