Control Of Hazardous Energy

Lockout/Tagout
Millersville University - Office Of Environmental Health & Safety

Scope & Application

The Lockout/Tagout program applies to the control of energy during servicing and/or maintenance of machines and equipment. This program specifically outlines the definitions, procedures and training requirements to be utilized by Millersville University employees to guard against the unexpected energizing, start-up, or release of stored energy that could cause injury. It is 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

Definitions

Affected Employee – Person who operates equipment or machinery on which service work is being performed under lockout/tagout, or someone who works in such an area.
Authorized Employee – A person who locks or implements a tagout procedure on machines or equipment to perform service work or maintenance on that machine or equipment. Note: Can also be the Affected Employee.
Energy – The capacity or force present in machines or equipment to do work, causing movement or possible movement. Note: Locks and tags do not de-energize equipment. Attach them only after machinery has been isolated from its energy source.
Energy Isolating Device – A mechanical device that physically prevents the transmission or release of energy. Be aware that push buttons, selector switches and other control circuit type devices are not energy isolating devices.
Energy Source – Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other form of energy.
Lockout – The placement of a lockout device on an energy-isolating device, following established procedure, to ensure the energy-isolating device and equipment 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.
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.
Point of Control – Any electrical or mechanical device, such as a switch or a valve, which regulates or stops the flow of energy between machine and energy source.
Residual Energy (also known as Potential Energy) – Latent or leftover energy remaining in a machine after it has been shut down (e.g., a turning shaft or electricity stored in a capacitor).
Tagout – A written warning telling a co-worker not to operate a switch, lever, or valve that could release hazardous energy or set a machine in motion. The tag is the warning device.
Two Person Rule – A safety rule stating that two people must be present to remove a lock that was placed by someone else, and that no lock may be cut until all workers are known to be clear of the machine or equipment which is locked out
Zero Energy State – State of equipment or machinery in which all residual energy has been dissipated to a safe level and has been verified as such

General

Authorizations – A designated Millersville University representative (usually the supervisor) who may authorize the use of this program to individuals associated with the control of hazardous energy on any Millersville University system, machinery, or equipment.

The Director of Environmental Health & Safety working with the supervisors and managers, will implement the program and ensure that personnel are trained in accordance with the procedures established herein. This responsibility may be delegated to another person or persons 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 is required to lock and/or tagout machines or equipment prior to performing service or maintenance.

Each department utilizing the Millersville University 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.

Tagout – If an energy-isolating device is capable of being locked out, the authorized employee must utilize lockout. Tagout procedures can be used only if lockout procedure is not possible and tagout is at least equally effective at protecting worker safety. When using tagout, take additional steps to prevent unexpected energization (e.g., remove valve hand wheels, locking control switches, etc).

When a tagout device is used on an energy-isolating device that is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached.

A standard tag, as suggested by the illustration at left, shall accompany lockout devices used for the implementation of this program.

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 Director 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 are being followed.

Locks – A lockout device must be capable of ensuring the equipment can not be restarted or energy supplied to the machine. Each authorized employee is responsible for the care and maintenance of their locks and keys. Only the authorized employee will have the keys to their locks. Authorized employees will not share their keys with other employees.

A standard lock, as suggested by the illustration at left, shall be used to perform lockout procedures. Authorized employees will have, at a minimum, two locks with keys. Employees will request additional locks through their supervisor. Locks will be purchased from the LO/TO equipment vendor, and will not be obtained through the locksmith department.

Standard Electrical LO/TO Kit – Each Authorized employee in the Facilities Department will be provided with a standard lockout/tagout kit (see illustration at left) for performing basic electrical safety lockout/tagout procedures.

The kit contains locks, keys, tags, a variety of lockout devices, and multiple lock hasps. Each authorized employee is responsible for the care and maintenance of their LO/TO kit.

Procedures

Only authorized employees shall perform implementation of the lockout or tagout system. 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. Notify all affected employees that machinery and equipment will be out of service.
2. Machine or equipment shutdown: An orderly shutdown must be utilized to avoid any additional or increased hazards to employees as a result of equipment de-energization. If the equipment is in operation, follow normal stopping procedures (e.g., depress stop button, open toggle switch, etc).
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. Move switch or panel to “off” or “open” positions and close all valves or other energy isolating devices so that the energy source is disconnected or isolated from the machinery or equipment. Make sure to isolate all energy sources including back up power systems.
4. Application of Lockout/Tagout: Authorized employees shall affix lockout or tagout devices to each energy-isolating device. Lockout devices will be affixed in a manner that will hold the energy-isolating devices in the "off" or "safe" position. Lock and tagout all energy devices by use of hasps, chains and valve covers with assigned individual locks. Only Millersville University lockout/tagout equipment is approved for use. When employees are involved in work on locked out equipment, each person puts his/her lockout/tagout device at the lockout point on a lock hasp or in a group “lock box.” Make sure tags are easily visible to anyone entering the area. Fasten the tag directly to or close to the lock. Tagout devices, where used, will be attached at the same point as a lock would be affixed. If the tag cannot be attached at that point, the tag will be located as close as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device. Tags will be affixed in such a manner as will clearly state that the operation or movement of energy-isolating devices from the "off" or "safe" position is prohibited. Also, ensure that all tags are completely and correctly filled out.
5. Release stored energy: Following the application of the lockout/tagout devices to the energy isolating devices, all potential or residual energy must be relieved, disconnected, restrained, and otherwise rendered safe. This includes, but is not limited to, making sure all moving parts have stopped, installing ground wires, relieving trapped pressure, releasing the tension on springs or blocking their movement, block or brace any part that might move or fall, block or brace any part that might move or fall due to pneumatic or hydraulic pressure, bleed lines, drain process piping and close valves, purge all tanks and lines, dissipate stored thermal energy (heat and cold), etc. Where the re-accumulation of stored energy to a hazardous energy level is possible, verification of isolation will be continued until maintenance or servicing is complete. Stored energy (capacitors, springs,

elevated members, rotating fly wheels, and hydraulic/air/gas/steam systems) must be relieved or restrained by grounding, repositioning, blocking and/or bleeding the system.

6. Methods of releasing and/or controlling stored energy:
    - Make sure all moving parts have stopped
    - Install ground wires
    - Relieve trapped pressure
    - Release the tension on springs or block their movement
    - Block or brace any part that can fall
    - Block parts in pneumatic or hydraulic systems that could move due to loss of pressure
    - Bleed lines, let vent valves open
    - Drain process piping systems and close valves to stop flow of hazardous materials
    - To block a line where there is no valve, use a blank flange
    - Purge all tanks and lines
    - Dissipate extreme cold or heat
    - Make sure stored energy does not re-accumulate to harmful or dangerous levels
7. Verification of Equipment 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.
    - Make sure the area is clear of personnel
    - Verify that main disconnect switch or circuit breaker can not be moved into the on position
    - Use a voltmeter or other device to check the switch
    - Press all start buttons and activate controls
    - Shut off machine controls when finished testing the equipment

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.

Lockout or Tagout Device Removal - The employee who applied the device shall remove each lockout or tagout device from each energy-isolating device. Do not remove other employee’s lockout or tagout devices.

Removing Other Locks and Tags - 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. However, this removal must follow the Two Person Rule. That is, two people must be present when another employee's lock and/or tag are removed from an energy isolating device. One of these two employees must be the supervisor. The specific procedure for removing another employee's lock or tag shall include at least the following elements:

- Verification by the immediate supervisor and the employee requesting that the lock be removed, that the employee who applied the device is not at the facility, (i.e., is on vacation, off sick, etc.),
- The supervisor and the employee requesting the lock be removed must make all reasonable efforts to contact the authorized employee to inform them that his/her lockout or tagout device will be or has been removed, and,
- The supervisor will ensure that the authorized employee has this knowledge before they resume work at the facility.
- In general, only remove other employee's locks and tags in emergency situations. If possible, delay the maintenance or service activity until the employee can return to work and remove the lock/tag themselves.

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.
- If additional maintenance or service work needs to be performed, reapply the lockout/tagout devices (repeat the procedures to isolate and control the energy).

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 Millersville University representative and the outside employer shall inform each other of their respective lockout or tagout procedures. The designated Millersville 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.

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:

- Ensuring all locks, tags, and procedures used by multiple employees must be equally capable of protection
- Designating a primary authorized person (employee) to organize and oversee the group LO/TO procedure
- 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.
- Other authorized employees 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.
- Verify isolation and shut down before a new employee adds their lock to the group lockout procedure
- Ensuring the primary authorized employee removes his/her lock and the multi-lock accepting device when all service or maintenance has been completed.
- Ensuring the primary authorized employee verifies that all other employees have removed their locks, removed their tools and equipment, and are clear of the area, before restarting the machine or equipment.

Shift or Personnel Changes - Follow these procedures to insure the orderly transfer of lockout or tagout devices between shifts (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,

- 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.

Tag Out Only - Tag out only should only be used when the machine or equipment can not physically be locked out and the tag out only procedure is at least as effective at protecting worker safety. When tagout systems are used, employees shall also be trained in the following limitations of tags:

- Tags are essentially warning devices affixed to energy-isolating devices, and do not provide the physical restraint that is provided by lockout.

- When a tag is attached to an energy-isolating means, it is not to be removed by anyone except the issuing authorized agent. A tag is never to be bypassed, ignored or otherwise defeated.
- 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.
- Tags and their means of attachment must be made of materials that will withstand environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
- Tags must be securely attached to energy- isolating devices so that they cannot be inadvertently or accidentally detached during use.

Training

The heads of departments or their designated representatives are required to provide training to ensure that employees understand the purpose and function of the energy control program. Through training, employees will be required to possess the knowledge and skills required for safe application, usage, and removal of energy controls. The Director of EHS will develop the core training curriculum and conduct initial training for authorized employees. Any work specific training (such as the use of energy control devices specific to a particular trade) will be conducted by the supervisor or their designee). All new employees must receive the training before they begin to use LO/TO procedures. Employees who should receive training include:

- **Authorized Employees** - 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 necessary for energy isolation and control.
- **Affected Employees** - Each affected employee shall be instructed in the purpose and use of the energy control procedure.

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.