Lock Out/Tag Out (LOTO)

Date of last revision: September 2010
Preface

The University has implemented The Control of Hazardous Energy (Lockout/Tagout) Program to assure the safety of employees who may work in the vicinity of, or on, mechanical or electrical systems. Many sources of energy are used to power machinery, equipment, processes and operations in the workplace. These hazardous energy sources include electrical, mechanical, hydraulic, chemical and thermal. Failure to recognize and control energy sources before work is performed on these systems can result in serious injuries or even death. It is vital to the safety of employees that effective procedures be followed when servicing or repairing machinery and equipment.

Maintenance and repair work may involve other safety hazards that are not directly addressed by this program. These hazards may include, but are not limited to:

- Work conducted on electrical utilization systems that should be addressed using procedures from the Clemson University Electrical Safety Work Practices Program
- Work in confined spaces, such as utility vaults, that are covered under the Clemson University Confined Space Entry Program
- Work associated with electric power generation, transmission and distribution systems
- Work conducted more than four (4) feet above the ground on electric poles (not applicable when a qualified person is changing location on the pole) or work conducted more than six (6) feet above the ground where fixed supports or barriers do not prevent the potential of employee falls.

Further information on required employee safety programs may be found in the Clemson University Health and Safety Manual.

Introduction

The purpose of this program is to reduce the number of injuries caused by accidental start-up of a machine or piece of equipment that is undergoing servicing or routine maintenance. The accidental start-up of machines or equipment can occur from the release of stored energy or when equipment controls are accidentally activated. This program establishes the minimum requirements for the control of such hazardous energy.

A “lockout device” is just that - a locking device that provides a positive means for rendering a switch, valve, or any energy source inoperable. The device may be a padlock, restraining bar, chain, or any device that positively prevents a machine or piece of equipment from becoming “energized” or from releasing stored energy.

A “tagout device” serves as a lockout and is a means of identifying who locked out the machinery, the date and time of day the lockout took place, and the department for which the person works. There is additional information that may be placed on the tag such as beeper number, extension number, etc. Tags must be of a durable nature and be securely fastened to the locking mechanism so as not to fall off.

An Affected Employee is one whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under Lockout/Tagout or whose job requires him or her to work in an area in which such servicing or maintenance is being performed. An Affected Employee cannot perform work under a Lockout/Tagout permit.

An Authorized Employee is the person who either applies the locks and tags on machines, equipment and systems or works under the protection of Lockout/Tagout in order to perform
servicing or maintenance on that machine or equipment. This person has completed the mandatory training to be qualified as an Authorized Employee. Only an Authorized Employee installs and removes his or her own lock(s) and tag(s) as required by this program.

Tags or lockout devices are NEVER to be removed by anyone except the individual who is responsible for the lockout/tagout procedure.

Policy
Employees of Clemson University shall follow Lockout/Tagout procedures:

• During servicing and/or maintenance of machines and equipment.
• During removal or bypassing of a machine guard or other safety device.
• When placing any part of their body into an area where work is actually performed (point of operation) including danger zones with respect to a machine’s normal operating cycle.

General Safety Guidelines
It is the responsibility of Department Heads or their designees to complete an equipment specific LOTO procedure using the attached Equipment Energy Control Planning Procedure for every piece of machinery or equipment prior to servicing. This form needs to be completed only one time. The following information must be included:

• Machine or equipment identification.
• Energy sources and isolation devices for each piece of machinery and equipment, and their location.
• The procedure or method required for Lockout/Tagout.
• The shutdown and start-up procedures.

Training
Employees shall be trained so that they understand the purpose, contents and requirements of this LOTO program and procedures.

A record of all training and retraining shall be maintained. The training record (Employee Training Acknowledge form attached) shall include the name of the employee, name of the instructor and the date of the training. Training records will be retained indefinitely.

Employees retraining will be conducted when there are changes in job assignment; machines, equipment or processes; or in the University’s LOTO program and procedures. Retraining will also be conducted when a periodic inspection of the effectiveness of this procedure reveals inadequacies in employee knowledge or performance.
Procedure Exemption

There are occasions where specific written LOTO procedures are not required. They are *not required when all of the following elements exist*:

1. The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shut down which could endanger employees.
2. The machine or equipment has a single energy source that can be readily identified and isolated.
3. The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment.
4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
5. A single lockout device will achieve a locked-out condition.
6. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
7. The servicing or maintenance does not create hazards for other employees.
8. The department, in using this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

A specific written procedure for all machines, equipment or systems that are not exempt as identified above shall be developed and will be followed before beginning any servicing or maintenance work. Please use the attached Equipment Energy Control Planning Procedure form to document either the LOTO exemption or the LOTO procedure. The steps outlined below will serve as a guide in accomplishing this requirement.

Detailed LOTO Procedure

Affected Employees must be notified by the Authorized Employee of the application and removal of LOTO devices. Notification must be given before the controls are applied, and after they are removed from the machine or equipment.

**Preparation for shutdown**

Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have been trained.

The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown will avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

**Lockout or tagout device application**

Install all energy isolating devices that are needed to control the energy to the machine or equipment to isolate the machine or equipment from the energy source(s).
Tagout devices, where used, shall be attached in such a manner that will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

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.

Energy Isolation

Evaluation

• Review the surrounding area for other possible sources of energy transmission.
• Inspect the immediate area where locks or tags will be attached.
• Notify all employees in the general vicinity that LOTO procedures are being implemented.

Electrical Control

• Unplug the machine or piece of equipment using an electrical plug lock or a disconnect switch with padlocks, locks and tags.
• Ensure that all power sources are locked and tagged out.
• Bleed any stored electrical energy to a “zero energy state.”
• Use a tester to check that all circuits are dead.

Pneumatic Control

• Release the pressure to reach a “zero energy state.”
• Lockout the energy source using lockout valves.

Hydraulic Control

• Release pressure valve to reach a “zero energy state.”
• Lockout the energy source using lockout valves, chains, padlocks, or locks.

Fluids and Gasses

• Evaluate all hoses and valves.
• Insert a blank or blind in the line.
• Use lockout valves, chains, padlocks, or locks at the isolating source.

Mechanical Control

• Release or block all stored mechanical energy. Be cautious of gravity, springs, tension and other sources of energy that are not always obvious.
• Restrain energy using blocks.
• Lockout and tagout energy using padlocks, locks, and tags.
• Recheck all areas for potential sources of energy.
Verification of isolation

Prior to starting work on machines or equipment that have been locked out or tagged out, the Authorized Employee shall try to startup the machine or equipment to verify that the machine or equipment has been de-energized. (Example: pushing local start buttons, throwing switches, etc.). Ensure the operating controls are returned to the OFF or NEUTRAL positions. The work can now begin.

More than One Person LOTO

When more than one person will be involved with maintenance or repair of a piece of machinery or equipment requiring isolation of energy source, each shall place their locks and tags on the energy isolating device.

When the machinery or equipment cannot accept more than one lock or tag, an additional hasp or similar energy isolating device shall be used, if feasible. Should this technique not be feasible, one lockout device can be used requiring a key, and the key shall be placed in a lockout box or cabinet that accommodates multiple employee locks to secure it. Each employee that works on the machine, equipment or system will place their lock and tag on the lockbox or cabinet. As each employee no longer needs to maintain lockout protection, they shall remove their locks from the box or cabinet.

Restoring Machines and Equipment to Normal Operations

When maintenance or servicing has been completed and the machinery or equipment is ready to be placed into normal operation, check out the immediate area to confirm that no one is exposed to any danger.

- Remove or check that all tools have been removed from the machinery or equipment.
- Confirm that all guards, pulleys, and safety devices have been reinstalled and are secure.
- Remove all locks and tags only after one final check to ensure all employees are in the clear.
- Operate the energy isolating devices to restore energy to the machine or equipment.
- Notify all Affected Employees that all LOTO devices have been removed and that the machine or equipment is now safe to operate.

Removal of Authorized Employee Locks and Tags When Off-site

There may be times when the LOTO needs to be closed out to put equipment back into service when an Authorized Employee still on the LOTO is off-site and cannot be located. Removal of an Authorized Employee lock and tag without the Authorized Employee’s signature will require a review by the Authorized Employee’s direct Supervisor.

The Authorized Employee’s Supervisor will attempt to reach the Authorized Employee to determine if the LOTO may be closed. If the Authorized Employee indicates that the
LOTO may be closed, the Authorized Employee must return to the site to follow the normal LOTO removal procedure.

If the Authorized Employee cannot be contacted or cannot return to the facility, the Authorized Employee’s Supervisor may authorize removal of the Authorized Employee from the LOTO.

If the Supervisor authorizes the removal of the Authorized Employee’s lock(s) and tag(s) all potentially affected employees shall be notified.

The Authorized Employee will be contacted by his/her Supervisor immediately upon their return to work, to notify them that they have been removed from the LOTO.

**Contractors**

Outside contractors that will be performing work on site must follow OSHA compliant LOTO procedures and the requirements as stated below.

The Clemson University contract administrator and the outside Contractor firm must coordinate LOTO procedures when University employees may be impacted by the LOTO event. The responsibility to train outside contractor employees lies with their employer.

There are several LOTO conditions that must be met by the outside Contractors before they begin work at the University.

- The Contractor shall establish and have available for review a LOTO program that meets 29 CFR 1910.147, Control of Hazardous Energy (LOTO); 29 CFR 1910.333, Lockout/Tagout Electrical Safe Work practices; and 1926.417, locking and tagging of circuits, as they relate to the control of hazardous energy sources.

- Prior to the Contractor performing work, a designated point of contact will be made within the Contractor’s organization for the purpose of interfacing and coordinating the LOTO procedures.
Periodic LOTO Inspections

The Department shall conduct a periodic inspection of all energy control procedures at least annually. The inspections are to be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected. Departments may use this review to correct any deviations or inadequacies identified.

Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of the employees' responsibilities under the energy control procedure being inspected.

Note: All Departments on main campus may perform a single annual inspection in March of each year.

Certify Inspections

The Department shall certify that the periodic inspections have been performed. The certification shall identify (1) the machines or equipment on which the energy control procedures are utilized, (2) the dates of the inspections, (3) the employees included in the inspections, and (4) the persons performing the inspections.
Employee Training Acknowledgment

I, ___________________________________, acknowledge receipt of training with regard Clemson University’s Control of Hazardous Energy Program and Lockout/Tagout Procedures. I understand the purpose for having such a plan is to reduce injuries resulting from the accidental startup of a machine or piece of equipment while undergoing service or routine maintenance. I have been instructed to identify the piece of machinery and/or equipment and its energy source utilizing the company’s Survey for Applying Lockout/Tagout Devices prior to beginning any lockout/tagout procedures. I understand that it is my responsibility to notify all co-workers of a machine’s or equipment’s inactive state each time I begin lockout/tagout procedures. Finally, I have specifically been issued the following Lockout/Tagout Device for my use only:

(Insert Identifying Number of Lockout/Tagout Device)

Training was received on the _____ day of __________________, 19_____

Employee’s Signature: _______________________________ Date: ________________

Trainer’s Signature: _______________________________ Date: ________________
**Purpose:** This procedure establishes the minimum requirements for lockout of energy sources that could cause injury to personnel. All employees shall comply with the procedure.

**Responsibility:** The responsibility for seeing that this procedure is followed is incumbent upon all employees. All employees shall be instructed in the safety significance of the lockout procedure by their supervisor or manager. Each new or transferred affected employee shall be instructed by their supervisor or manager in the purpose and use of the lockout procedure.

**Preparation for Lockout:** Employees authorized to perform lockout shall be certain as to which switch, valve, or other energy isolating devices apply to the equipment being locked out. More than one energy source (electrical, mechanical, or others) may be involved. Any questionable identification of sources shall be cleared by the employees with their supervisors or managers.

### Energy Source | Isolation Device(s) | Location(s)
--- | --- | ---
Electric | | |
Pneumatic | | |
Hydraulic | | |
Gravity | | |
Mechanical | | |
Thermal | | |
Chemical | | |
Other | | |

**Potential Hazards:**

Remember to Release All Stored Energy and notify Supervisor after lockout but before starting work.

**Shutdown Procedure:**

**Start-up Procedure:**

**Restoring Equipment to Service:** When the job is complete and equipment is ready for testing or normal service, check the equipment area to see that no one is exposed. When the equipment is clear, remove all locks. The energy isolating device may be operated to restore energy to the equipment.

**Rules for Using Lockout Procedure:** All equipment shall be locked 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 bearing a lock.
Review the following exceptions to determine if you must use or write a specific procedure for this LOTO action.

MARK EACH BOX IF IT APPLIES:

- [ ] The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shut down which could endanger employees

- [ ] The machine or equipment has a single energy source which can be readily identified and isolated

- [ ] The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment

- [ ] The machine or equipment is isolated from that energy source and locked out during servicing or maintenance

- [ ] A single lockout device will achieve a locked-out condition

- [ ] The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance

- [ ] The servicing or maintenance does not create hazards for other employees

- [ ] The employer, in utilizing this exception has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance

**IF ALL BOXES ARE CHECKED** – **YOU DO NOT** HAVE TO WRITE A SPECIFIC PROCEDURE FOR THIS LOTO ACTION.

If at least one box is unchecked and there are no procedures already written for this LOTO requirement, complete the other side, make a copy for your supervisor, and post this procedure on or near the equipment in a plastic sleeve.

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