

The Control of Hazardous Energy Lockout/Tagout Plan

Fitchburg State University

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1.0 Purpose

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment at Fitchburg State University (Fitchburg State). It will be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or startup of the machine or equipment or release of stored energy could cause injury.

2.0 Scope

This procedure applies to all Fitchburg State employees who may be exposed to hazardous energy during service or maintenance work. Uncontrolled energy includes potential, kinetic, flammable, chemical, electrical, and thermal sources.

3.0 Employer and employee responsibilities

Fitchburg State is responsible for implementing and enforcing this procedure.

- All employees must comply with this procedure.
- Supervisors must enforce the use of lockout and tagout devices when employees do service or maintenance work and may be exposed to hazardous energy.
- Employees who do service and maintenance work must follow the lockout/tagout procedures described in this procedure.
- Employees who work in areas where lockout/tagout procedures are used must understand the purpose of the procedures and are prohibited from attempting to restart machines or equipment that are locked or tagged out.

4.0 LOTO Procedures

4.1 Cord n plug Connected Equipment

Potentially hazardous energy in cord and plug connected equipment must be controlled by the employee. Employees can protect themselves by preventing the equipment from becoming reenergized during the servicing operation. Follow either of these two procedures.

1. Unplug the equipment from its electrical socket. Place a lockable cover over the plug. Place your lock on the plug cover.
2. Unplug equipment from its electrical socket. Keep the plug in your possession at all times during equipment servicing; or keep the plug within arm's reach and in your line of sight at all times during equipment servicing.

4.2 Sequence of Lockout

Lockout procedures, other than cord n plug, will follow this sequence.

1. Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
2. The authorized employee will refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, will understand the hazards of the energy, and know the methods to control the energy.
3. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).
4. De activate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).
5. Lock out the energy isolating device(s) with assigned individual lock(s).
6. Stored or residual energy (such as that in capacitors, 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 grounding, repositioning, blocking, bleeding down, etc.
7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate. Use voltmeter to verify power has been de-energized.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

8. The machine or equipment is now locked out.

4.3 Restoring Equipment to Service

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps will be taken.

1. Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout devices.

5. Re-energize the machine or equipment and verify proper operation.
6. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

4.4 Electrical Lockout

Authorized employees who perform electrical maintenance where the electrical circuit has been locked out, will follow these procedures. No work is to be done on live parts.

1. A tag used without a lock will be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.
2. A qualified person will use test equipment and proper personal protective equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and will verify that the circuit elements and equipment parts are de-energized. The test will also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even through specific parts of the circuit have been de-energized and presumed to be safe. If the circuit to be tested is over 500 volts, nominal, the test equipment will be checked for proper operation immediately after this test.

4.5 Procedure Involving More than One Person

Every employee servicing a piece of equipment that must be locked out is required to be protected from accidental machine movement or startup with his or her own personal lock.

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

4.6 Shift or Personnel Changes

In the event of a shift/personnel change, the oncoming authorized person will check out the machine/equipment and ensure proper lockout procedures have been followed and will apply their personal lock when the procedures have been verified.

4.7 Lock Removal

An employee will never remove another person's lockout without management approval and/or supervision. If an employee forgets to remove a lockout/tagout device and goes home, the company management will make every effort to get in touch with the authorized employee. If the employee cannot be contacted, another authorized employee and the supervisor will check out the equipment and make sure there is no danger in removing the lock. A supervisor will remove the device. The absent authorized employee will be notified that his lock was removed before he returns to work.

4.8 Lockout/tagout Procedures for Outside Contractors

Outside contractors will use the lockout/tagout procedure enforced by their own company. If the outside contractor does not have procedures regarding control of hazardous energy, they may use our procedures. The outside contractor will provide us a copy or description of their procedure so that we can ensure that our employees understand and comply with the restrictions and prohibitions of the outside contractors lockout procedures.

5.0 Specific Energy-Control Procedures

Fitchburg State requires supervisors to identify, develop and document specific procedures for machines or group of machines. Refer to **Appendix B** for procedures and forms.

6.0 Training

All employees will be trained in our lockout/tagout procedures. Levels of training will depend upon each employee's involvement with our procedures. All training will be documented and kept on file.

1. **"Authorized"** employees are those who perform machine maintenance and servicing that requires lockout. They are the only individuals who will lockout equipment and will be expected to know our lockout procedures. Training for authorized employees will include 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. **"Affected"** employees are those who work in areas where lockout may take place. They will not perform lockout procedures, nor service or repair any locked out equipment. Training for affected employees will include the purpose, use and recognition of the energy control procedure.
3. **"Other"** employees are those whose work may require them to be in areas where lockout is used. Training for other employees will include the procedure and the

prohibition relating to attempts to restart or re-energize machines or equipment which are locked or tagged out.

7.0 Periodic Inspections

At least annually, there will be an inspection conducted by an authorized employee not involved with the specific lockout/tagout procedures to ensure that requirements of our procedures are being followed. Refer to Appendix C for annual inspection form.

The annual inspection is to be conducted by an authorized employee (other than the ones using the lockout/tagout procedure) and is intended to assure that the energy control procedures continue to be implemented properly and that employees involved are familiar with their responsibilities. It is also intended to identify and correct any deviations or inadequacies observed. The inspector must be able to determine : whether the steps in the energy control procedure are being followed; whether the employees involved know their responsibilities under the procedures; and whether the procedure is adequate to provide the necessary protection and what changes, if any, are needed.

This inspection will be documented and will include the following:

1. Identity of the machine or equipment on which the energy control procedure was being utilized;
2. Date of the inspection;
3. Employees included in the inspection; and
4. Name of person performing the inspection.

Appendix A – Definitions

Affected employee A person who uses equipment that is being serviced under lockout or tagout procedures, or who works in an area where equipment is being serviced.

Authorized employee A person who locks out or tags out equipment to do service or maintenance work. An affected employee becomes an authorized employee when that employee's duties include service or maintenance work on equipment.

Capable of being locked out An energy-isolating device that is designed with a hasp or other means of attachment 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 lock out can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy-control capability.

Disconnect A switch that disconnects an electrical circuit or load (motor, transformer, or panel) from the conductors that supply power to it. An open circuit does not allow electrical current to flow. Under a lockout procedure, a disconnect must be capable of being locked in the open position.

Energized Connected to an energy source or containing potential energy.

Energy source Any source of energy. Examples: electrical, mechanical, hydraulic, pneumatic, chemical, and thermal.

Energy-isolating device A mechanical device that physically prevents transmission or release of energy.

Hazardous energy Any of the types of energy existing at a level or quantity that could be harmful to workers or cause injury through inadvertent release or start-up of equipment.

Lockout device A device that locks an energy-isolating device in the safe position.

Lockout Placing a lockout device on an energy-isolating device, under an established procedure, to ensure the energy-isolating device and the equipment it controls can't be operated until the lockout device is removed. (An energy-isolating device is capable of being locked out if it has a hasp that accepts a lock or if it has a locking mechanism built into it.)

Procedure A series of steps taken to isolate energy and shut down equipment.

Servicing or maintenance Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining machines or equipment. Also includes lubricating, cleaning, unjamming, and making adjustments or tool changes if a worker may be exposed to the unexpected startup of the equipment during such activities.

Tagout device A prominent warning sign, such as a tag, that can be securely fastened to an energy-isolating device to indicate that the energy-isolating device and the equipment it controls can't be operated until the tagout device is removed.

Tagout Placing a tagout device on an energy-isolating device, under an established procedure, to indicate that the energy-isolating device and the equipment it controls can't be operated until the tagout device is removed.

APPENDIX B

SPECIFIC ENERGY CONTROL PROCEDURES (LOCKOUT/TAGOUT)

To assure that before any employee performs servicing or maintenance on a machine or equipment, the machine or equipment was isolated and rendered inoperative, you need to develop and document specific procedures for each machine or group of machines. To assure compliance you should:

- a. Make an inventory of each machine or process for the entire worksite where servicing and maintenance are performed.
- b. Group the machines/processes by similar characteristics (i.e. cord-n-plug; single energy course; types of energy - hydraulic, pneumatic, kinetic, thermal, chemical) which can cause unexpected energization or startup of the machines/processes or release of stored energy which could cause injury to employees.
- c. Develop specific procedures to indicate the proper method to lockout and tagout machines and equipment while servicing or maintenance is being performed. Note that this should be done for each machine/process group identified in (a) above.
- d. Use the worksheet attached to help you develop specific procedures. Definitions are as follows:

Operator Controls - The type of controls available to the operator need to be determined. This should help identify energy sources and lockout capacity.

Energy Sources - Can the machine be locked out at the main power source? Some machine installations involve complex wiring schemes. A qualified electrical should evaluate machines were necessary to determine if all electrical circuits can be locked out. Check and/or list energy sources present on this equipment.

Shutdown Procedures - List in order the steps necessary to shut down and de-energize the equipment. You must be specific. For stored energy, be specific about how the energy will be dissipated or restrained.

Startup Procedure - List in order the steps necessary to re-activate (energize) the equipment. Ensure during each step that personnel are clear during any testing or activation.

MACHINE SPECIFIC ENERGY CONTROL PROCEDURES (LOCKOUT/TAGOUT)

Machine/equipment:

Equipment Identification:

Operator Controls:

Energy Sources:

- Electrical Steam Pneumatic Other
 Natural Gas Hydraulic Stored Energy Source _____

Identify Energy Source/location

**Lockable
(Yes)(No)**

Type Device Required

Shutdown Procedures:

Lock Type & Procedure:

De-energized & Verified (How):

Startup Procedure:

SAMPLE MACHINE SPECIFIC ENERGY CONTROL PROCEDURES (LOCKOUT/TAGOUT)

Machine/equipment		AHU's	
Equipment Identification		Hammond Penthouse AC1, AC2, AC3, AC4, AC5	
Operator Controls		Electrical Disconnects	
Energy Sources: <input checked="" type="checkbox"/> Electrical <input checked="" type="checkbox"/> Steam <input checked="" type="checkbox"/> Pneumatic <input type="checkbox"/> Other <input type="checkbox"/> Natural Gas <input type="checkbox"/> Hydraulic <input checked="" type="checkbox"/> Stored Energy Source - Kinetic			
Identify Energy Source/location		Lockable	Type Device Required
Electrical		Yes	Padlock and Breaker lock
Steam Valve		Yes	Valve cover and Padlock
Shutdown Procedures:			
1. Notify all affected employees of lockout 2. Turn off main electrical supply 3. Install Breaker lock 4. Turn off all motors at VFD's 5. Install VFD disconnect lock 6. Place tag on controls indicating lockout 7. Check to assure the fan blades are stopped 8. Close Steam Valve		9. Lock Steam valve in closed position	
Lock Type & Procedure:			
_ Electrical - disconnect at main breaker and VFD's. Secure with padlock/Breaker lock (if needed, use multiple lock device) _ Steam - locate main shutoff valve at overhead steam supply line. Close valve and lock (use multiple locking device when needed).			
De-energized & Verified (How):			
_ Electrical - Use voltmeter to verify power has been de energized. _ Steam - Verify all pressure gauges read "zero".			
Startup Procedure			
1. Remove all tools and materials from area. 2. Replace all covers and guarding devices 3. Check that all personnel are in a safe area out from any hazards		4. Restore energy sources 5. Restart equipment and verify proper operation 6. Notify all affected employees	

Lockout/Tagout Evaluation Checklist

SECTION I: GENERAL INFORMATION	
Date:	Inspector(s):
Authorized Employee(s):	
Affected or Other Employee(s):	
Specify equipment & location where the LOTO procedure is being used:	

SECTION II: LOCKOUT/TAGOUT PROCEDURE		
(1) Were all "affected" and "other" employees verbally notified of the lockout?	Yes	No
(2) Were operational controls turned to the "Off" position prior to lockout?	Yes	No
(3) Were all energy sources turned to the "Off" or "Safe" position?	Yes	No
(4) Were lockout devices and locks properly attached to each energy isolation device?	Yes	No
(5) Were warning tags indicating the authorized employee's name and the date attached to each energy isolation device?	Yes	No
(6) Was all stored energy properly controlled? (Pneumatic & hydraulic energy bled, suspended parts lowered, etc)	Yes	No
(7) Was an attempt made to restart the equipment or otherwise ensure the effectiveness of the lockout prior to beginning the service work?	Yes	No
(8) If a group lockout was required, did all authorized employees attach their own locks and tags to each energy isolation device?	Yes	No
(10) Were all locks and devices properly removed after servicing?	Yes	No
(11) Were all "affected" and "other" employees verbally notified when the lockout was complete?	Yes	No

SECTION III: INSPECTION RESULTS AND SIGNATURES	
Please fully explain all "No" responses and note any other deficiencies that are not specifically covered by a checklist item:	
Authorized Employee Name:	Date:
Signature:	Date:
Inspector Name:	Date:
Signature:	Date:

Appendix C

Annual Lockout/Tagout Inspection Form

Directions:

- Conduct inspections at least annually
- Use one form for each machine or equipment that has a written Lockout/Tagout Procedure
- Keep the original on file and send a copy to Environmental Health & Safety

Department/Shop:	Unit:	Date:
Machine/Equipment Inspected:		

Employees included in the inspection:

1.	2.	3.
4.	5.	6.
7.	8.	9.

Review the Lockout/Tagout Procedures and employee responsibilities with the authorized employees and complete the following:

1. Do the employees understand the Lockout/Tagout Procedures and their responsibilities under the University Lockout/Tagout Plan?

YES NO If no, indicate corrective action taken:

2. Do the employees follow the Lockout/Tagout Procedures?

YES NO If no, indicate corrective action taken:

3. Are the established Lockout/Tagout Procedures effective to provide full protection?

YES NO If no, indicate corrective action taken:

4. Other discrepancies noted and corrective actions taken:

Person(s) Conducting Inspection:

Name:	Signature:	Department:
Name:	Signature:	Department: