

LOCKOUT/TAGOUT PROGRAM 29 CFR 1910.147

Scope

The OSHA Control of Hazardous Energy (Lockout/Tagout) standard (29 CFR 1910.147) covers the servicing and maintenance of machines and equipment in which the unexpected energization, startup of the machines or equipment, or release of stored energy could cause injury to employees. Energy sources may include: electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal or other energy.

Application

This standard applies to the control of energy during servicing and/or maintenance of machines or 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 if:

1. An employee is required to remove or bypass a guard or other safety device; or
2. 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.

Applications Not Covered:

1. Minor tool changes and adjustments and other minor servicing activities which take place during normal production operations are not covered by the standard if they are routine, repetitive and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective machine safeguarding protection.
2. Cord and plug connected electrical equipment when the employee performing the service or maintenance controls energization by unplugging the equipment from the energy source and by the plug being under his/her exclusive control.
3. Hot tap operations involving transmission and distribution systems from substances such as gas, steam, water or petroleum, when they are performed on pressurized pipelines, provided that the employer demonstrates that: continuity of service is essential, shutdown of the system is impractical, documented procedures are followed and employees are effectively protected by special equipment.

Energy Control Program

The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

Core Components of The Energy Control Program

1. Energy control procedures that detail and document the specific information that an authorized employee must know to accomplish lockout/tagout, namely, the scope, purpose, authorization rules and techniques to be utilized for the control of hazardous energy.
2. Periodic inspections of the energy control procedures to ensure that the procedures and the requirements of the standard are being followed.
3. Employee training and retraining, along with additional training under a lockout tagout system, to ensure that the purpose and function of the energy control programs are understood by everyone.

Energy Control Procedures Documentation

Employee must develop, document and use specific procedures to control potentially hazardous energy when employees are servicing equipment or machinery.

The procedures must outline the scope, purpose, authorization, rules and techniques that the employer will use to control hazardous energy and must state the means to be used to enforce compliance.

At a Minimum, the Procedures Must Include:

1. A specific statement of the intended use of the procedure.
2. Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy.
3. Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices, and a description of who has the responsibility for them.
4. Specific requirements for testing a machine or piece of equipment to determine and verify the effectiveness of lockout devices, tagout devices and other energy control.

Documentation of the Procedures Is Not Required If:

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

Periodic Inspection

Periodic inspections must be conducted, at least annually, to ensure that the energy control procedures continue to be implemented properly, that the employees are familiar with their responsibilities and that any deviations or procedural inadequacies that are observed are corrected. The person conducting the inspection should be an authorized employee not involved in the energy control procedure being inspected.

The Inspection Should, at a Minimum, Include the Following:

1. The employer must identify any deficiencies or deviations and correct them.
2. Where lockout is used, the inspector must review each authorized employee's responsibilities under the procedure with that employee (group meetings are acceptable).
3. Where tagout is used, the inspector must review both the authorized and affected employee's responsibilities with those employees for the energy control procedure being inspected and the additional training responsibilities of 1910.147(c)(7)(ii).

4. The employer must certify that the periodic inspections have been performed.

The Inspection Certificate Should:

1. Identify machine on which the procedure was utilized.
2. Date of inspection.
3. Identify the employees included in inspection.
4. Identify person who performed the inspection.

Employee Training and Communication

Employees must be trained so that they understand the purpose and function of the energy control program and acquire the knowledge and skills necessary for the safe application, usage and removal of the energy controls.

The Following Employees Require Training:

1. Authorized employees must receive training on 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 must receive training on the purpose and use of the energy control procedure.
3. Other employees (those whose work activities are or may be in an area where energy control procedures may be utilized) must be instructed about the procedure and about the prohibition relating to attempts to restart or re-energize machines or equipment that are locked out or tagged out.

Employers Must Also Train Employees 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 and it is never to be bypassed, ignored or otherwise defeated.
3. Tags must be legible and understandable by all employees.

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 Employees and Affected Employees Whenever:

1. There is a change in their job assignments.
2. A change in machines, equipment or processes that present a new hazard.
3. When there is a change in the employer's Lockout/Tagout program.

Additional training shall be conducted:

1. Whenever a periodic inspection reveals noncompliance.
2. Whenever the employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures. The retraining shall re-establish employee proficiency and introduce new or revised control methods and procedures as necessary.

The employer shall certify that employee training has been accomplished and is being kept up to date. When a tagout system is used, the employees shall also be trained in the limitations of tags.

Notification of Employees

Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

Application of Energy Control

To safely apply energy control to machines or equipment (using either lockout or tagout devices), authorized employees must perform certain procedures, in a specific order.

1. **Preparation for shutdown:** Before an authorized or affected employee turns off a machine or equipment, the authorized employee must 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:** The machine or equipment must be turned off or shut down using the appropriate procedures established for it to avoid any additional or increased hazards to employees because of the machine or equipment stoppage. Notify the affected workers prior to shut down.
3. **Machine or equipment isolation:** All energy isolating devices that are needed to control the machine's energy source must be located. These devices must then be used to isolate the machine or equipment from its energy source. Place energy isolating devices in off position
4. **Lockout or tagout devices application:**
 - Authorized employees must affix lockout or tagout devices to each energy-isolating device.
 - Each authorized employee shall place his/her own personal lockout device or tagout device on the energy isolating device(s).
 - When an energy-isolating device cannot accept multiple lock or tags, a multiple lockout or tagout device (hasp) may be used.
 - If lockout is used, 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 the box or cabinet.
 - Each authorized employee will then use his/her own lock to secure the box or cabinet.

- Lockout devices when used must be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position.
- Where tagout devices are used, it must be affixed in a manner that 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 attachment shall be fastened at the same point at which the lock would have been attached.
- If the tag cannot be affixed directly to the energy-isolating device, the tag must 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.
- **Stored energy:** After the energy-isolating device has been locked out or tagged out, all potentially hazardous stored or residual energy must be relieved, disconnected, restrained or otherwise 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.
- **Verification of isolation:** Before any work begins on machines or equipment that have been locked out or tagged out, an authorized employee must verify that the machine or equipment has been properly isolated and de-energized. This can be done by attempting to restart equipment. For final verification use monitoring equipment. If stored energy reaccumulates isolation must be verified continuously.

Equipment for Lockout/Tagout

For achieving lockout/tagout, employee will be provided with appropriate lockout equipment. Equipment shall include, but not be limited to:

Padlocks	Lockout clamps
Lockout tags/devices	Circuit breaker lockout

- 1. Padlocks** - One or more padlocks will be issued to each authorized employee. Each employee will have an individual key. Only one key per lock shall be issued. These locks may be used only for lockout purposes. Locks will be identified by a number assigned to each employee and/or using a nametag. Only the authorized person may apply and remove the lock, and the key may never be given to another person.
*A second or master key for each lock will be issued to designated supervisors to enable them to open and remove a padlock under certain circumstances.
- 2. Lockout Clamps** - These devices are designed to accommodate more than one lockout padlock when more than one person is working on de-activated equipment. Each person, to assure his or her safety, will apply a lock and warning tag and remove it when the task is completed.
- 3. Warning Tags** - Authorized employees will be issued warning tags which must be used whenever a padlock cannot be applied. The tag must be affixed as closely as possible to the energy disconnect with a single purpose 50-pound strength plastic tie. Extra caution must be exercised since there is no physical restraint when only a tag is used, and energy can be restored without removing a padlock. In addition, where possible, energy source components should be altered, removed or obstructions should be placed to restrict access to energy disconnects. Electricians may remove fuses but must attach a tag to the panel involved and remove it when the machine is ready for service and the fuse is replaced.

Tag legends may include, but not limited to:

DANGER Do Not Star	DANGER Do Not Energize
DANGER Do Not Open	DANGER do Not Operate
DANGER Do Not Close	DANGER Hands Off

Warning signs must comply with ANSI-Z535 (2001) standards.

Warning tags shall bear the name of the authorized person and the date of application.

Tags must be durable, weather proof and not easily damaged.

Release from Lockout/Tagout

The lockout/tagout standard includes requirements for releasing machines or equipment that have been locked out or tagged out prior to restoring energy to the equipment and using it. Before lockout or tagout devices are removed, and energy restored, authorized employees must complete certain procedures.

1. Machine/equipment inspection: the work area must be inspected to ensure that nonessential items (e.g., tools, spare parts) have been removed and that all the machine or equipment components are operationally intact.
2. Positioning of employees: The work area must be checked to ensure that all employees have been safely positioned or have cleared the area. In addition, all affected employees must be notified that the lockout or tagout devices have been removed before the equipment is started.
3. Lockout or Tagout device removal: each lockout or tagout device must be removed from the energy-insulating device by the employee who applied the device.

When can an employee other than the one who applied the lockout/tagout device remove the device?

When the authorized employee who applied the lockout/tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program.

Steps to be taken (by employee other than the one who applied the lockout/tagout device) to remove the device:

1. The employee must verify that the authorized employee who applied the device is not at the facility.
2. The employer must make sure all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed.

3. The employer must ensure that the authorized employees know that the lockout device has been removed before he/she resume work at the facility.

Temporary Removal of Lockout or Tagout Devices

In some circumstances, employees need to temporarily restore energy to a machine or equipment during servicing and/or maintenance to test and/or reposition the machine or piece of equipment. Lockout or tagout devices may be removed temporarily to perform these tasks.

Sequences of Action for Removal of the lockout/tagout devices:

1. The machine or equipment must be cleared of tools and materials.
2. Employees must be removed from the machine or equipment area.
3. All lockout or tagout devices may then be removed,
4. Authorized employees may then proceed to energize and test or position the equipment or machinery.
5. Following testing or positioning, all systems must be de-energized and energy control measures reapplied to continue the service and/or maintenance.

Restoring Equipment to Service

When servicing or maintenance is completed and the machine or equipment is ready to turn to normal operating condition, the following steps shall be taken by the authorized person:

1. Visually inspect the machine or equipment and the immediate area around the machine or equipment to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
2. Visually inspect the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that controls are on neutral.
4. Remove the lockout device(s) and re-energize the machine or equipment.

NOTE: The removal of some forms of blocking may require re-energization of the machine before safe removal.

5. Notify affected employees that the servicing or maintenance is completed, and the machine or equipment is ready to use.

Group Lockout/Tagout Procedures

If more than one authorized employee is required to lockout or tagout equipment, the following organizational procedures/structures shall be followed.

1. Each authorized employee shall affix a personal lockout or tagout 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 stop working on the machine or equipment being serviced or maintained.
2. A primary authorized employee shall be designated to exercise primary responsibility for implementation and coordination of the lockout/tagout of hazardous energy sources and for the equipment to be serviced.
3. The primary authorized employee would coordinate with the equipment operators before and after completion of servicing or maintenance operations that required lockout/tagout.
4. A verification system would be implemented to ensure the continued isolation and the de-energization of hazardous energy sources during the maintenance and servicing operations.
5. Each authorized employee will be ensured of his/her right to verify individually that the hazardous energy has been insulated and/or de-energized.
6. When more than one crew, craft, department, etc., is involved, each separate group of servicing/maintenance personnel would be accounted for by a principal authorized employee from each group. Note: The principal authorized employee is an authorized employee who oversees or leads a group of servicing or maintenance workers such as plumbers or electricians. Each principal authorized employee is responsible to the primary authorized employee for maintaining accountability of each worker in that specific group. No authorized employee may attach or remove another authorized

person's lock/tag unless the provisions of the exception to 29 CFR 1910.147(e) (30 are met.

Maintaining Continuity of Lockout/Tagout Protection During Shift or personnel changes:

Employees must ensure the continuity of employee protection by providing for the orderly transfer of lockout or tagout device protection between off going and incoming employees. This will help to minimized exposure to hazards from the unexpected energization or startup of the machine or equipment or the release of stored energy.

Outside Personnel (Contractors)

1. Whenever contractors and other outside servicing personnel perform tasks covered by the lockout/Tagout standard, they must adhere to all standard's requirements.
2. The contractors or outside employer and the on-site employer must inform each other of their respective energy control program.
3. The on-site employer must ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

Requirements for Lockout/Tagout Devices

1. Must be durable, so they can withstand the environment to which they are exposed for the maximum period that exposure is expected
2. Must be singularly identified.
3. Must be the only devices used for controlling energy.
4. Must not be used for other purpose.
5. Must be standardized within the facility in at least one of the following criteria: color, shape or size. Additionally, tagout device must be standardized as to print and format.
6. Must be identifiable, in that it indicates the identity of the employee applying the devices.

Hardware Requirements for Lockout

1. Lockout equipment must be substantial enough to prevent removal without the use of excessive or unusual technics such as with the use of bolt cutters or other metal cutting tools.

Hardware Requirements for tagout:

1. Must be constructed and printed so that exposure to weather conditions or wet and dump locations will not cause the tag to deteriorate or the message on the tag to become illegible.
2. Must not deteriorate when used on corrosive environment such as areas where acid and alkaline chemicals are handled and stored.
3. Must be standardized in print and format.
4. Must be substantial to prevent inadvertent or accidental removal.
5. Must have an attachment means of no-reusable type, attachable by hand, self-locking and non-releasable with a minimum unlocking strength of less than 50 pounds and having the general design a basic characteristic of being at least equivalent to a one piece all environment tolerant nylon cable tie.
6. Must warn against hazardous conditions if the machine or equipment is energized.
7. Must include a legend such as: **Do Not Start, Do Not Open, Do Not Close, Do Not Energize and Do Not Operate.**

Appendix A

Definitions

Affected Employees – An employee whose job requires him/her to operate or use a Machine/equipment on which servicing, or maintenance is being perform under lockout or tagout.

Authorized Employee – An employee who locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment.

Capable of being locked out – In energy insulating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, can be lock can be affixed, or has a locking mechanism built into it. Other energy insulating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild or replace the energy isolating or permanently alter its energy control capability.

Energized – Connected to an energy source or containing residual or stored energy.

Energy Isolating Device – a mechanism device that physically prevents the transmission or release of energy. Manual operated disconnect switches, line valves, blocks and slides gates are example of energy control devices that provide visible indication of the position of the device. “On/off buttons, selectors switches and other control circuit devices are not energy control devices.

Energy Sources - An electrical, mechanical, hydraulic, chemical, nuclear, thermal or other energy.

Hot Tap - A procedure used in the repair, maintenance and servicing activities which involves welding or a piece of equipment (pipelines, vessels or tanks) under pressure, to install connections or appurtenances. 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.

Lockout – The placement of a lockout device on an energy isolating device and the equipment being controlled can not be operated until the lockout device is removed.

Lockout Device – A device that utilizes a positive means, such as lock, either key or combination, to hold an energy isolation device in a safe position and prevent energization of a machine or equipment.

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

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 machines or equipment and adjusting or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

Setting up – any work performed to prepare a machine or equipment to perform its normal production operation.

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

Tagout Device- A prominent warning device, such as a tag, which can be securely fastened to 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 has been removed.

Appendix B

Lockout/Tagout Program Checklist

Inspector:

Date:

Equipment, Machinery and Personnel	Yes	No
1. All new machinery (after Jan. 1990) can accept a lockout device.		
2. A list of all authorized employees has been developed.		
3. A list of all affected employees has been developed		
Energy Control		
1. A writing Energy Control Program has been developed.		
2. Does the written program state the methods of compliance, including the: Intended use of procedures, steps for shutdown, isolating, blocking and securing energy, steps for placement, removal, and transfer of lockout/tagout devices, requirements for testing to verify effectiveness of lockout/tagout.		
3. Compliance with energy control procedures is verify at least annually		
4. The results of the inspection are kept on file.		
5. Lockout/tagout devices are provided. (locks, hasps, tags, etc.)		
6. Lockout devices are singularly identified, durable, standardized, substantial and employees identifiable.		
7. Lockout devices are used only for energy control.		
8. A tagout system is used only if an isolating device cannot be locked out.		
9. Tagout devices are locked at the same location as lock out devices.		
10. Tagout devices warn against hazardous conditions such as Do Not Start, Do Not Open.		
11. Energy isolation is performed ONLY by authorized employees.		
12. Affected employees are notified before and after lockout/tagout		
13. Group lockout/tagout procedures are used when needed.		
14. Information about each other's lockout program is exchanged with contractors		
15. Continuity of lockout/tagout is provided during shift changes.		
Training Requirements		
Authorized employees – Recognition of energy sources, type and magnitude of energy and methods and procedures necessary for isolation and control.		
1. Affected employees – purpose and use of energy control procedures.		
2. For tagout system – limitations of tags.		
3. Retraining – when changes in job, assignment, equipment, process, procedure or the result of an inspection.		
4. Training is certified with names and dates.		

Appendix C

Procedures for Controlling Hazardous Energy

1. Source(s) of Hazardous Energy

Electrical	Natural Gas	Springs
Hydraulic	Gravity	Steam
Chemical	Pneumatic	Thermal

Other: _____

2. Notify affected employees that the machine/equipment is about to be shut down and locked out.

Specific Instructions:

3. Shut down the machine/equipment using normal stopping procedures.

Specific Instructions:

4. Isolate all energy sources listed above.

Specific Instructions:

5. A) Apply locks to all isolate devices operated in Step Four.

Specific Instructions:

B) if a tag is used in lieu of a lock when the energy isolating device is incapable of lockout, the following additional safety precaution will be taken:

Specific Instructions:

6. Block or dissipate all stored energy in rams, flywheels, springs, pneumatic or hydraulic systems and steam or gas lines.

Specific Instructions:

7. Verify that the Machine/equipment is locked out by testing the machine operating controls.

Return All Controls to the “Neutral” or “Off” Position after testing.

Specific Instructions:

Appendix D

Procedures for Removing Locks/Tags

1. Check the machine/equipment to be sure it is operationally intact, tools have been removed and guards have been replaced.

Specific Instructions:

2. Check to be sure all employees are safely positioned.

Specific Instruction:

3. Notify all affected employees that locks/tags are going to be removed and the machine/equipment is ready for operation.

Specific Instruction:

4. Remove all locks, blocks, or other energy restrains.

Specific Instructions: _____

Restore all energy to the machine/equipment.

Specific Instructions:

Other Comments/Special Procedures

Appendix E

Date

Florida International University

Machine/Equipment Name(s)

Annual Power Lockout/Tagout Inspection Worksheet

Review with Employee(s) Performing Service or Maintenance on the Following:	Yes	No
1. Have you had your lockout training?		
2. Do you have a safety lock?		
3. Are lockout procedures for the above machine/equipment available and/or posted?		
4. Do you know and understand your lockout responsibilities?		
5. Observations:		
6. Were lockout procedures followed?		

List Deviation(s) or Inadequacies Observed:

Corrections/Changes/Comments:

Employee(s) Observed:

Name **Department**

Name **Department**

Name **Department**

Name **Department**

Name **Department**

Name **Department**

Inspected By:

Name **Job Title**