



1910.147: CONTROL OF HAZARDOUS ENERGY – LOCKOUT/TAGOUT

INTRODUCTION

This course covers broad issues of the control of hazardous energy during servicing or maintenance of machines and equipment as detailed in OSHA's regulation 1910.147 The control of hazardous energy (lockout/tagout). Our discussion will take place in four parts. Part one will discuss the history of the standard. Part two will cover lockout/tagout fundamental concepts. Part three will cover requirements for equipment, periodic inspections, and training. Part four will detail the requirements for the application of energy controls, the release from lockout, and additional energy control requirements.



LEARNING OBJECTIVES

- Become familiar with the history and background of the standard.
- Understand the basic concepts of the regulation.
- Understand the requirements for equipment, training and periodic inspections.
- Understand the requirements for the application of energy controls, the release from lockout, and additional energy control requirements.



KEY TERMS

- **Affected employee**

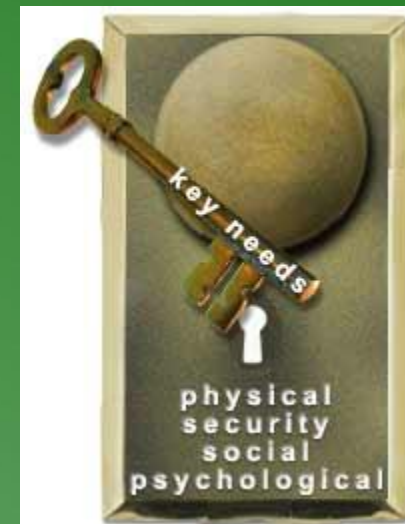
An employee who performs the duties of his or her job in an area in which the energy control procedure is implemented and servicing or maintenance operations are performed.

- **Authorized employee**

An employee who performs servicing or maintenance on machines and equipment.

- **Energy source**

Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.



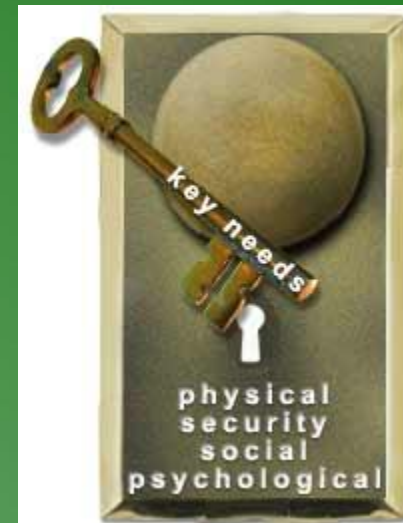
KEY TERMS

- **Energy control procedure**

A written document that contains those items of information an authorized employee needs to know in order to safely control hazardous energy during servicing or maintenance of machines or equipment.

- **Energy control program**

A program intended to prevent the unexpected energizing or the release of stored energy in machines or equipment on which servicing and maintenance is being performed by employees.



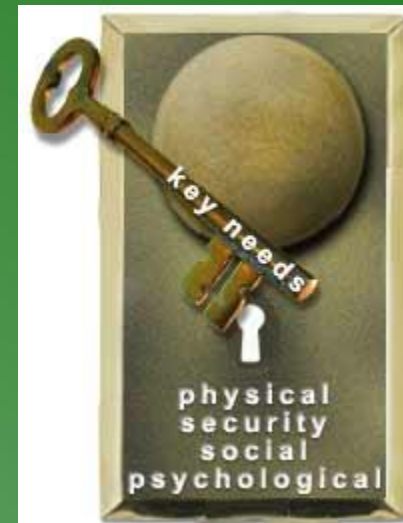
KEY TERMS

- **Lockout**

The placement of a lockout device on an energy - isolating device, in accordance with an established procedure, ensuring that the energy - isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

- **Lockout device**

Any device that uses positive means such as a lock, either key or combination type, to hold an energy - isolating device in a safe position, thereby preventing the energizing of machinery or equipment.



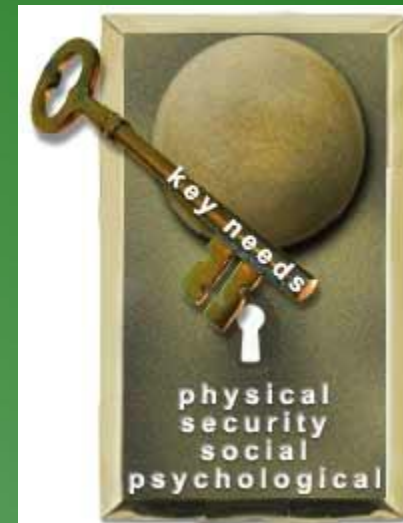
KEY TERMS

- **Tagout**

The placement of a tagout device on 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 is removed.

- **Tagout device**

Any prominent warning device, such as a tag and a means of attachment, that can be securely fastened to an energy - isolating device in accordance with an established procedure.



LESSON 1

BACKGROUND AND HISTORY

This lesson focuses on the following topics:

- Scope And Exemptions
- Application Of Procedure
- Purpose Of Requirements
- Additional Information

LESSON 1

SCOPE AND EXEMPTIONS

The lockout/tagout standard applies to general industry employment and covers the servicing and maintenance of machines and equipment in which the unexpected start-up or the release of stored energy could cause injury to employees.

If employees are performing service or maintenance tasks that do not expose them to the unexpected release of hazardous energy, the standard does not apply.



LESSON 1

SCOPE AND EXEMPTIONS

These regulations do not cover:

- The industries of construction, agriculture, and maritime
- Installations under exclusive control of electric utilities for power generation, transmission and distribution
- Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations (See OSHA Subpart S)
- Oil and gas drilling and servicing



LESSON 1

SCOPE AND EXEMPTIONS

Also excluded from these guidelines:

- Normal production operations (See OSHA Subpart O)
- Hot tap operations, under special conditions
- Servicing or maintaining cord and plug connected electrical equipment, as long as the hazards are controlled by unplugging the equipment from the energy source; and the plug remains under the exclusive control of the employee performing the service and/or maintenance.

LESSON 1

APPLICATION OF PROCEDURE

The OSHA standard for The Control of Hazardous Energy (Lockout/Tagout), is found in Title 29 Code of Federal Regulations (CFR) Part 1910.147. It addresses the practices and procedures necessary to disable machinery or equipment, thereby preventing the release of hazardous energy while employees perform servicing and maintenance activities.

The standard outlines measures for controlling hazardous energies – electrical, mechanical, hydraulic, pneumatic, chemical, thermal, potential, and other energy sources.



LESSON 1

APPLICATION OF PROCEDURE

Employees servicing or maintaining machines or equipment may be exposed to serious physical harm or death if hazardous energy is not properly controlled. Compliance with the lockout/ tagout standard prevents an estimated 120 fatalities and 50,000 injuries each year.



LESSON 1

PURPOSE OF REQUIREMENTS

The standards establish requirements that employers must follow when they are exposed to hazardous energy while servicing and maintaining equipment and machinery. The following are the general requirements for lockout-tagout standards:

- Develop, implement, and enforce an energy control program.
- Use lockout devices for equipment that can be locked out.
- Ensure that new or overhauled equipment is capable of being locked out.
- Develop, document, implement, and enforce energy control procedures.
- Use only lockout/tagout devices authorized for the particular equipment or machinery and ensure that they are durable, standardized, and substantial.

LESSON 1

PURPOSE OF REQUIREMENTS

- Ensure that lockout/tagout devices identify the individual users.
- Establish a policy that permits only the employee who applied a lockout/tagout device to remove it.
- Perform periodic inspections on established energy control procedures
- Provide effective training for all employees covered by the standard.
- Comply with the additional energy control provisions in this and other OSHA standards when machines or equipment must be tested or repositioned, when outside contractors work at the site, in group lockout situations, and during shift or personnel changes.

LESSON 1

ADDITIONAL INFORMATION

One of the keys to this course, obviously, is the ability to differentiate between a lockout and tagout device. Click on the term and drag it to the corresponding definition.

Lockout device

Any device that uses positive means such as a lock, either key or combination type, to hold an energy - isolating device in a safe position, thereby preventing the energizing of machinery or equipment.

Tagout device

Any prominent warning device, such as a tag and a means of attachment that can be securely fastened to an energy-isolating device in accordance with an established procedure.

LESSON 1

ADDITIONAL INFORMATION

Here are some additional terms to learn before proceeding with further lessons:

- Capable of being locked out
- Energy-isolating device
- Energized

LESSON 1

ADDITIONAL INFORMATION

Capable of being locked out

An energy-isolating device is considered capable of being locked out if it meets one or more of the following requirements:

- It is designed with a hasp to which a lock can be attached;
- It is designed with any other integral part through which a lock can be affixed;
- It has a locking mechanism built into it; or
- It can be locked without dismantling, rebuilding, or replacing the energy isolating device or permanently altering its energy control capability.

LESSON 1

ADDITIONAL INFORMATION

Energy-isolating device

Any mechanical device that physically prevents the transmission or release of energy. These include, but are not limited to, manually-operated electrical circuit breakers, disconnect switches, line valves, and blocks.

Energized

Machines and equipment are energized when (1) they are connected to an energy source or (2) they contain residual or stored energy.

LESSON 2

LOCKOUT/TAGOUT REGULATIONS

This Lesson focuses on the following topics:

- Conditions of Lockout/Tagout
- Energy Control Procedure
- Periodic Inspections

LESSON 2

CONDITIONS OF LOCKOUT/TAGOUT

If an energy isolating device is not capable of being locked out, a tagout system shall be used

If an energy isolating device is capable of being locked out, a lockout shall be used, unless the employer can show that tagout system provides full employee protection



LESSON 2

CONDITIONS OF LOCKOUT/TAGOUT

New or Modified Equipment

Machines or equipment being replaced or having major repair, renovation, or modification must be capable of being locked out

Any new machine or equipment purchased after January 2, 1990 must be capable of being locked out

LESSON 2

CONDITIONS OF LOCKOUT/TAGOUT

When tagout is used on equipment which is capable of being locked out

- Tags shall be attached where lockout devices would be, and
- The employer must demonstrate that tagout will provide safety equivalent to lockout

Equivalent protection requires compliance with tagout provisions and additional measures, such as removal of isolating circuit element, blocking of a controlling switch, etc.



LESSON 2

ENERGY CONTROL PROCEDURE

OSHA requires that written procedures be used to control potentially hazardous energy when employees are engaged in the servicing and maintenance of machines and equipment, if the "unexpected" energization, start up, or release of stored energy could cause injury to employees.



LESSON 2

ENERGY CONTROL PROCEDURE

The only time written procedures are not required for machines and equipment is when all eight of the following elements are present:

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 which 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

LESSON 2

ENERGY CONTROL PROCEDURE

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; and
8. The employer, in using this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

LESSON 2

ENERGY CONTROL PROCEDURE

Written procedures must clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

- A specific statement of the intended use of the procedure;
- Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;
- Specific procedural steps for the placement, removal and transfer of lockout devices and the responsibility for them; and
- Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices and other energy control measures.

LESSON 2

ENERGY CONTROL PROCEDURE

Exceptions to A Documented Program

Documentation is not needed when all of the following exist:

- Equipment:
 - has no potential for stored/residual energy
 - has a single energy source
 - is isolated from energy source & locked out
 - Isolation & lockout of one energy source completely deactivates equipment

LESSON 2

ENERGY CONTROL PROCEDURE

- Single lockout device achieves locked-out condition
- Lockout device is under exclusive control of authorized employee performing maintenance
- No other hazards are created
- Employer has had no related accidents

LESSON 2

ENERGY CONTROL PROCEDURE

Materials/Hardware

Materials and hardware shall be provided by the employer. Whichever devices are used, they must be singularly identified – not to be confused with similar equipment – they must be the *only* devices used for controlling hazardous energy, and must meet the following requirements:

- Durable
- Standardized
- Substantial
- Identifiable



LESSON 2

ENERGY CONTROL PROCEDURE

Durable

Lockout and tagout devices must withstand the environment to which they are exposed for the maximum duration of the expected exposure. Tagout devices must be constructed and printed so that they do not deteriorate or become illegible, especially when used in corrosive (acid and alkali chemicals) or wet environments.

Standardized

Both lockout and tagout devices must be standardized according to either color, shape, or size. Tagout devices must also be standardized according to print and format.

LESSON 2

ENERGY CONTROL PROCEDURE

Substantial

Lockout and tagout devices must be substantial enough to minimize early or accidental removal. Locks must be substantial to prevent removal except by excessive force of special tools such as bolt cutters or other metal cutting tools. Tag means of attachment must be non-reusable, attachable by hand, self-locking and non-releasable, with a minimum unlocking strength of no less than 50 pounds.

Identifiable

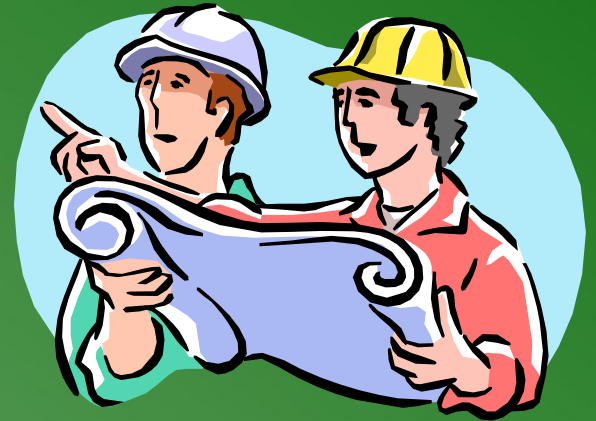
Lockout devices and tagout devices must indicate the identity of the employee applying the device (s).

LESSON 2

PERIODIC INSPECTIONS

Periodic inspections must be performed, at least annually, to assure that the energy control procedures (locks and tags) continue to be implemented properly and that the employees are familiar with their responsibilities under those procedures.

In addition, the employer must certify that the periodic inspections have been performed. The certification must identify the machine or equipment on which the energy control procedure was used, the date of the inspection, the employees included in the inspection, and the name of the person performing the inspection.



LESSON 2

PERIODIC INSPECTIONS

- For lockout procedures, the periodic inspection must include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.
- When a tagout procedure is inspected, a review on the limitation of tags, in addition to the above requirements, must also be included with each affected and authorized employee.

LESSON 3

PUTTING LOCKOUT/TAGOUT TO USE

This Lesson Focuses on The following topics:

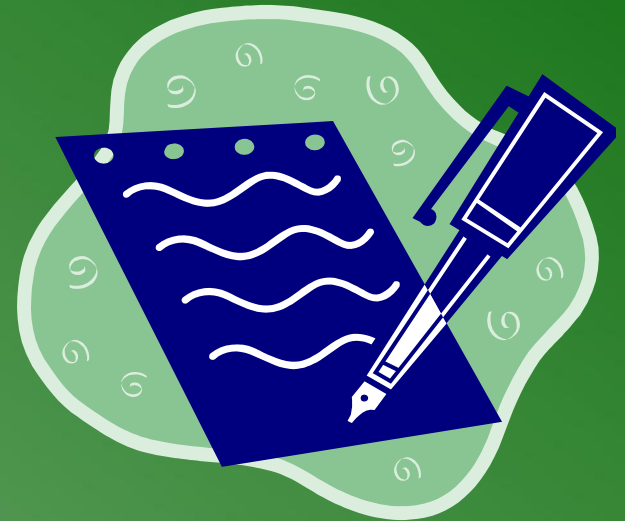
- Training requirements
- Application Of Energy Controls

LESSON 3

TRAINING REQUIREMENTS

The employer must provide effective initial training and retraining as necessary and must certify that such training has been given to all employees covered by the standard. The certification must contain each employee's name and dates of training.

For the purposes of the standard, there are three types of employees - authorized, affected, and other. The amount and kind of training that each employee receives is based upon the relationship of that employee's job to the machine or equipment being locked or tagged out, and the degree of knowledge relevant to hazardous energy that he or she must possess.



LESSON 3

TRAINING REQUIREMENTS

Following is the information about each employee in the training process:

- Authorized employees must receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
- Affected employees must be instructed in the purpose and use of the energy control procedure.
- Other employees must be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

LESSON 3

TRAINING REQUIREMENTS

Additional Training - Tagout System

Employees shall be trained in the limitations of tags, as follows:

- They are to be treated only as warning devices and nothing more
- Must not be removed, bypassed, or ignored
- Must be legible and understandable
- Must withstand environmental conditions
- May evoke false sense of security
- Must be securely attached

LESSON 3

TRAINING REQUIREMENTS

Retraining

- Retraining must be provided, as required, whenever there is a change in job assignments, a change in machines, equipment or processes that present a new hazard, or a change in energy control procedures.
- Additional retraining must be conducted whenever a periodic inspection reveals, or 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 procedure.

LESSON 3

APPLICATION OF ENERGY CONTROLS

Lockout or tagout can only be performed by the authorized employees who are performing the servicing or maintenance. Affected employees must be notified by the employer or the authorized employee of the application and removal of lockout devices or tagout devices. Notification must be given before the controls are applied, and after they are removed from the machine or equipment.

LESSON 3

APPLICATION OF ENERGY CONTROLS

Energy control procedures must include the following elements in the order given.

1. Preparation for shutdown

Before an authorized employee turns off a machine, the authorized employee must know the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy for that machine.

2. Machine shutdown.

The machine must be shut down in an orderly fashion, according to the machine-specific energy control procedure.

3. Machine isolation

All energy isolating devices that are needed to control the energy to the machine must be physically located and operated to isolate the machine from the energy source(s).

LESSON 3

APPLICATION OF ENERGY CONTROLS

4. Lockout or tagout device application

Locks must be placed to hold energy isolating devices in the “safe” or “off” position. Tags must clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited. Tags also must be fastened at the same point that a lock would be applied, or as close as possible.

5. Stored Energy

All sources of stored or residual energy must be located and be relieved, disconnected, restrained, and otherwise rendered safe.

LESSON 3

APPLICATION OF ENERGY CONTROLS

6. Verification of isolation

Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee must verify that isolation and de-energization of the machine or equipment have been accomplished. This is generally done by trying the “on” control. If the machine does not go on, isolation has been successful. The control must be returned to the neutral or off position before proceeding.

LESSON 3

APPLICATION OF ENERGY CONTROLS

Release From Lockout

Before lockout or tagout devices are removed and energy is restored to the machine or equipment, the authorized employee (s) must take the following actions or observe the following procedures:

- Inspect the work area to ensure that non-essential items have been removed and that machine or equipment components are intact and capable of operating properly;



LESSON 3

APPLICATION OF ENERGY CONTROLS



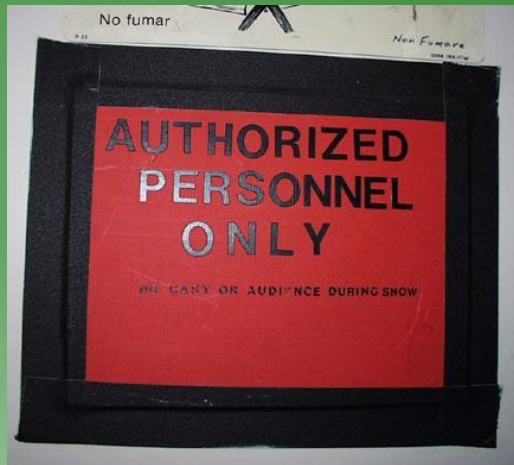
- Check the area around the machine or equipment to ensure that all employees have been safely positioned or removed;



- Notify affected employees immediately after removing locks or tags and before starting equipment or machines; and

LESSON 3

APPLICATION OF ENERGY CONTROLS



- Make sure that locks or tags are removed only by those employees who attached them.

[Click to view "Note"](#)

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

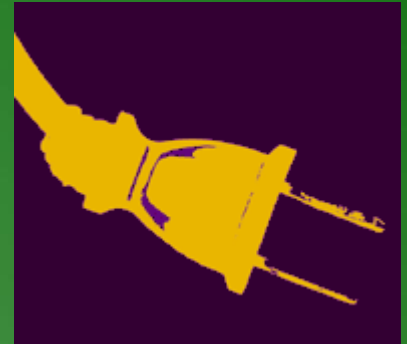
LESSON 3

APPLICATION OF ENERGY CONTROLS

Testing Of Machines

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

- 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.



LESSON 3

APPLICATION OF ENERGY CONTROLS

Outside Personnel

When hosting outside contractors where lockout/tagout will be used, the employer and the contractor must inform each other of the requirements of their respective energy control procedures.

The on-site employer must ensure that his employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.



LESSON 3

APPLICATION OF ENERGY CONTROLS

Group lockout or tagout

During all group lockout/tagout operations, each authorized employee performing service or maintenance shall be protected by his/her personal lockout or tagout device or comparable mechanism that affords equivalent protection.

Primary responsibility is given to one authorized employee to determine the exposure status (to the release of hazardous energy) for all employees when working under group lockout.



LESSON 3

APPLICATION OF ENERGY CONTROLS



Specific procedures must be developed for lockout operations that continue from shift to shift. They must include the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.