Lockout/Tagout And Alternative Methods
In a Lockout . . .

- A disconnect switch, circuit breaker, valve or other energy isolating device is put in the SAFE or OFF position.
What is lockout / tagout?

A method of keeping equipment from being set in motion and endangering workers.
In a Lockout . . .

- A lock is attached to the energy isolating mechanism to insure that it remains in the safe or off position.
In a Lockout . . .

The three most important things to remember are . . .

- Try
- Lock
- Try again
The Standard Provides Guidance Regarding

- Responsibilities of the principal parties involved in hazardous energy control.

- Design issues that influence the effective application of control methodology.

- Hazardous energy control program elements necessary for employee protection.

- Alternative methods development for tasks that are routine, repetitive, and integral to the production process, or where traditional lockout/tagout prohibits the completion of those tasks.
The Standard Provides Guidance Regarding

- Special application where traditional methods of hazardous energy control are inappropriate or impractical.

- Communication and training requirements for involved personnel.

- Management review of the total hazardous energy control process to ensure its functioning effectiveness.
The purpose of this standard is to establish requirements and performance objectives for procedures, techniques, designs, and methods that protect personnel where injury could occur from the unexpected release of hazardous energy.
Failure to Lockout Kills

- 58% of accident victims had never locked out when servicing or repairing equipment.
- 8 out of 10 of the accident victims didn’t even turn off the equipment before performing the work that resulted in injury.
- About one-half of the workers who did turn off the power (but didn’t lock it out) were injured by accidental reactivation of equipment.
- Only 2 out of a total 833 accident victims surveyed had attempted to fully lock out the equipment.
Purpose

Lockout/tagout is the primary method of hazardous energy control. When tasks are routine, repetitive, and integral to the production process, or traditional LOTO prohibits the completion of those tasks…..

Alternative methods of control that are based on risk assessment and that provide effective personal protection shall be used.
Tasks that are routine, repetitive and integral to production generally have most of the following characteristics

1. Short in duration.
2. Relatively minor in nature.
3. Occur frequently during the shift, day or week.
4. Usually performed by operators, set-up or maintenance.
5. Do not involve extensive disassembly.
6. Represent predetermined cyclical activities.
7. Expected to occur regularly.
8. Minimally interrupt the production process.
9. Exist even when optimal operating levels are achieved.
10. Require task specific personnel training.
The standard applies to but is not limited to, activities such as,

Erecting, installing, construction, repairing, adjusting, inspecting, unjamming, setting up, trouble shooting, testing, cleaning, dismantling servicing and maintaining machines, equipment or processes.
This program does not apply to cord and plug equipment when the plug remains under the exclusive control of the person performing the work.
Application

This standard *does not* apply to hot tap operations involving transmission and distribution systems.

Provided the user demonstrates that:

1. Continuity of service is essential
2. Shutdown of the system is impractical
3. Documented procedures are followed, and special equipment is used which will provide proven protection
Responsibilities

Users:
Users shall be responsible for complying with the applicable provisions of this standard by establishing an effective program for the protection of individuals from hazardous energy during activities.
Note: A user may become an integrator, modifier or a re-manufacturer if the user performs work within the definition of those entities.

Authorized individuals:
Authorized individuals shall be responsible for performing hazardous energy control in compliance with the program, procedures and training provided to them by the user.
For those functions when partial energization is necessary, the manufacturer, integrator, modifier or re-manufacture shall perform a risk assessment similar to that outlined in Annex A to determine the safest method of machine, equipment or process access.

When it is necessary for machines, equipment or processes to remain partially energized alternative control methodologies shall be provided for personnel safety.
Location  4.2.1

Energy isolating devices shall be accessible and, when practical, be conveniently located to facilitate the application of lockout devices during service and maintenance.

Identification  4.2.2

All energy isolating devices shall be adequately labeled or marked unless they are located and arranged so that their purpose is clearly evident. The identification shall include the following:

a. Machine, equipment, or process supplied
b. Energy type and magnitude.
The method of hazardous energy control selected depends on whether the task can be performed with or without energized conditions.

However, before adopting alternative methods of control, the user shall conduct a risk assessment that demonstrates the adequacy of the evaluation and the effectiveness of the protective measures. (See 5.4)
Lockout/Tagout Program

Lo/to is a systematic program that shall consist of the following elements to provide protection of personnel:

A. A survey of all hazardous energy.
B. Identification of energy isolating devices.
C. The selection and procurement of protective materials and hardware.
D. The assignment of responsibilities.
Lockout/Tagout Program

E. The determination of shut-down, de-energization, energization and start-up sequences.
F. Written procedures for machines, equipment and processes.
G. Training of personnel.
H. Auditing of program elements.
Decision Making Matrix
For Safeguarding Hazardous Energy
Alternative Measures  5.4

When lo/to is not used for tasks specified in 1.3 that are routine, repetitive, and integral to the production process or traditional lo/to prohibits the completion of those tasks, then an alternative method of control shall be used.

Selection of an alternative control method by the user shall be based on a risk assessment of the machine, equipment, or process specified in 5.4.1. The risk assessment shall take into consideration that existing safeguards provided with the machine, equipment or process may need to be removed or modified to perform a given task.
The alternative method selected shall have detailed procedures developed and documented for the control of hazardous energy.
A hierarchical process shall be employed in the selection of alternative control methodologies in the following order of preference.

a. Eliminate the hazard through design
b. Use engineered safeguards
c. Use warning and alerting techniques
d. Use administrative controls
e. Use personal protective equipment
The user shall provide initial training that will ensure that all authorized individuals understand the purpose and function of the energy control program. The following elements are to be included in a training program:

a. Individual training shall be carried out prior to authorized individuals performing service and maintenance tasks or being potentially exposed to hazardous energy.
b. Training shall be specific to the user’s written program.
c. The training program shall be developed using applicable manufacturer’s documentation, industry best practices, regulatory requirements and input from authorized individuals.
Training

d. Each authorized individual shall receive training in the type and magnitude of the energy available in the workplace.

e. Each authorized individual shall receive training in the type of energy that might be encountered during servicing or maintenance and methods or means to control and isolate that energy.

f. Training shall include samples of machine specific procedures and enable personnel to interpret and implement procedures developed.

g. The user shall document that all initial and additional training has been conducted. The documentation shall contain each individual’s name, dates of training, and the training topic.
The company should avoid exclusive use of generic training programs to ensure that authorized individuals adequately understand the company’s specific program.
Retraining shall be provided for all authorized individuals whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

Additional retraining shall also be conducted whenever an audit reveals, or whenever the user ahs other reason to believe, that the authorized individual’s knowledge or use of the energy control procedures is inadequate or inconsistent with the requirements.
Assessment of Training 5.5.4

The user shall conduct an assessment of the effectiveness of the training that is conducted. The assessment shall be done in such a way to ensure that authorized individuals demonstrate:

1. Knowledge of the program
2. Recognition and understanding of hazardous energy types
3. Use of appropriate hazardous energy control procedures

Authorized individuals who do not demonstrate an adequate level of knowledge or use of appropriate hazardous energy control procedures shall be retrained.
The user shall periodically assess the condition and effectiveness of each of the elements of the hazardous energy control program (5.2). The assessment shall include as a minimum, the written program, specific machine, equipment, process procedures, lo/to hardware, energy isolating devices, alternative methods, and communication and training.
Performance Feedback 5.6.3

The user shall establish a system for providing both positive and negative feedback to appropriate individuals and supervisors regarding the hazardous energy control program.

Where deficiencies are found, corrective action shall be taken and appropriate individuals informed of the required improvements.
General Information  
(Covered by the standard)

If an employee is required to remove or bypass a guard or other safety device;  

or  

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 or where an associated danger zone exists during a machine operating cycle.
Key
Lockout Work Rules

Any employee who fails to follow machine specific procedures may be subject to disciplinary action up to and including termination.

A multi-lock and tag system will be used if there is more than one employee working on a project.

Tags must identify the employee in control of the lockout attached to the energy control point.

Tags are required on all lockout equipment.
Transfer of lockout/tagout responsibility:

- No employee shall remove a lockout or tagout device affixed by another employee unless authorized.

- Responsibility for lockout or tagout remains that of the authorized employee who affixes the lockout or tagout device subject to the following exception.

- When an incoming authorized employee is to assume lockout/tagout responsibilities on a piece of equipment from a departing employee due to shift or personnel changes, the incoming employee shall affix his/her properly labeled lock and/or tag devices to the equipment.
In a Lockout . . .

- More than one lock can be used with a multi-lock hasp
Important Meanings

**Responsibility:** Means simply actions you are supposed to take.

**Authority:** Defines what decisions you can and cannot make.

**Accountability:** Means what results or conditions directly relating to you you have to answer for.
Primary Energy Sources

- Electrical
- Pneumatic
- Hydraulic
- Gas/water/steam/chemical
- Multiple
Secondary (Stored) Energy Sources

Mechanical motion

Gravity

Springs

Thermal energy

Stored electrical energy

Pneumatic pressure

Hydraulic pressure
1910.147(c)(1)
The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections.

1910.147(c)(4)(i)
Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by LO/TO.
The procedures shall 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.
Exception

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.
4. The machine or equipment is isolated from that energy source and locked during servicing.
Exception

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.
7. The servicing or maintenance does not create hazards for the employees.
8. The employer, in utilizing this exception has had no accidents involving the unexpected activation of the machine or equipment.
1910.147(c)(5)(ii) (A)(1)
Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

1910.147(c)(5)(C)(1)
Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques.

1910.147(c)(5)(D)
Lockout devices and tagout devices shall indicate the identity of the employee applying the device.
1910.147(c)(6)(i)
The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure the procedure and the requirement of this section are being fulfilled.

1910.147(c)(7)(i)
The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for safe application, etc. are acquired by employees. (Authorized, affected, other).
Locks, tags, chains, wedges, key blocks, adapter pins, self locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.

Lockout devices and tagout devices shall be singularly identified: shall be the only devices used for controlling energy; shall not be used for other purposes; and shall meet the following requirements.
Durable:
Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that is expected.

Tagout Devices
Shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

Standardized:
Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria:

- Color
- Shape
- Size

In the case of tagout devices, print and format shall be standardized
Substantial
Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

Identifiable
Lockout devices and tagout devices shall indicate the employee applying the device(s).
1. **Believe it!**
   Believe lo/to is essential, know the barriers to following ECPL procedures and how to overcome the barriers.

2. **Check it!**
   Check yourself, your equipment, the hazards and the problem.

3. **Prep It!**
   Prepare personnel, the area, yourself and the machine.

4. **Lock it!**
   Lock out all energy sources of primary energy which pose a potential hazard.
5. Release it!
Release, control and dissipate all stored or residual energies which pose potential hazards.

6. Verify it!
Make sure the machine is safe before you start work, and observe special cautions while performing the assigned task.

7. Use it!
Know what can be done at every level to reinforce ECLP training and how each associate can make the workplace safer for everyone.
Barriers to ECLP

- Personal Barriers
- Environmental Barriers
- Organizational Barriers
Personal Barriers

- Pride
- Fear
- The macho image
- Lack of knowledge
- Trade offs
- Disincentives
- Overconfidence
Knowledge

- Knowledge of the basic steps required in controlling and locking out energy.

- Knowledge of how to lock out each specific machine you work on.

- Knowledge of how to learn whenever you are not sure of what to do.
Environmental Barriers

The design of the machine is such that entry points of power and their appropriate disconnects are located in inconvenient positions.

The entry points of power for the different energy sources are not located in close proximity to one another.

With today’s tolerances, many machines cannot be accurately set with energy fully controlled and locked out.
Environmental Barriers

Some of the more advanced programmable machinery will lose memory in the event of power being shut down.

Disconnects that are broken, making it impossible to lock out in the normal way.

Electrical panels that are not labeled or worse yet, labeled incorrectly.
Organizational Barriers

An insufficient supply of lockout devices.

A plant not using departmental locks.

Failure to enforce ECPL procedures.

Direct production pressures.

Indirect production pressures.
Check It!

(Yourself)

Check yourself for fatigue.

Causes of fatigue:
- Lack of sleep
- Poor eyesight
- Stress
- Alcohol and drugs
- Anger
- Physical problems
Check It!

Check yourself for correct clothing.

- Loose fitting clothes are dangerous.
- Dirty clothes soiled with oil or grease can catch fire from a spark or cigarette.
Check It!

(Yourself)

Watch your shoes.

Wear safety shoes if needed.

Avoid high heels, sandals and platform shoes.

Always maintain footwear in good repair.

Avoid suction cup type soles because they trap lubricants in the cups.

Make sure your shoes fit well.
Check It!

(Yourself)

Always wear the correct protective clothing.

Always wear the correct eye protection for the job.

Avoid gloves that are too thick, too tight at the wrist and too stiff at the wrist.

Do not wear jewelry when you are working on or near moving machinery or energized circuitry.
Your tools should be clean. Greasy handles do not offer good grips.

Tool handles should be positioned to keep the wrist straight.

Ensure you have correct type and number of locks.

Make certain you have an approved multiple lockout device if your job requires it and be sure to use it properly.
Check Your Equipment

Never replace the safety lock with one of your own.

Never use or accept a combination lock.

Never use your safety lock on your locker, your toolbox or in any way other than for locking out energy.

Always have your safety lock with you.

Never loan your safety lock to anyone else.
Check for Hazards

Oil, water and chemical solutions on the floor.

**Lighting:**
- Direct glare
- Reflected glare
- Dark shadows
- Delayed eye adaptation

**Noise**

**Confined spaces:**
- Atmospheric hazards
- Mechanical hazards
- Physical hazards
- Difficult communication
Check for Hazards
(Hidden Hazards)

**People hazards:**
Never assume that people are absent. Check it out for yourself.

Never assume that other people are doing or have done what they said they would do. Check it out for yourself.

**Communication hazards**

**Concentration hazards**
Prep it!
Prepare Personnel

Inform some or all of the following people:

Production supervisor in charge of the equipment.

Maintenance supervisor or other immediate supervisor.

Machine operator

Other production personnel in the area.

Other skilled trades.
Prepare Yourself

How to shut down the equipment.

Sources of information:

Your own knowledge and experience.

Posted procedures.

Machine prints.

Other printed material.

Other people.
Prepare the Machine

Trace energy to locate acceptable disconnect points.

Trace energy to find out how it moves through the system.

Tracing energy tells you how many locks and what other devices you need for ECPL.

Tracing energy allow you to identify the stored energies or residual pressure which will have to be neutralized.
Examples of acceptable disconnects

• A lockable lever or handle on an electrical panel.

• A lockable hydraulic or pneumatic shutoff valve.

• A suitably located gate valve.

• A lockable air valve that bleeds to atmosphere.
12 WEST COOLING
BIN AUGERS

ALL BRADLEY
QUALITY CONTROL

ON
START
STOP
ON
Generic Lo/To Procedure

1. Notify all employees in the area that service/maintenance work is being performed.

2. Identify all energy control points and necessary equipment for securing points.

3. If equipment is running, shut down according to normal stopping procedures.

4. De-activate energy control devices so equipment is isolated from energy source.
Generic Lo/To Procedure (cont.)

5. Lockout all the energy control devices with appropriate protection device.

6. Dissipate or restrain stored or residual energy through blocking, bleeding, grounding, etc.

7. Verify isolation from energy by attempting to start/operate equipment.

8. Return all control buttons/switches to neutral/off position and perform assigned work.

9. Perform assigned work.
10. After the work is complete, remove non-essential materials from equipment.

11. Notify employees that the work is complete and check area to ensure everyone’s safety.

12. Verify all control buttons-switches are in neutral/off position.

13. Remove protective devices from energy control device.

14. Notify affected employees that the work complete and the machine is ready.
LOCK IT
Review

- Lockout / Tagout Six Step Procedure
  1. Preparation for shutdown (TRY)
  2. Equipment shutdown
  3. Isolation of energy sources
  4. Application of lockout device (LOCK)
  5. Control of stored energy
  6. Verify equipment is in O energy state (TRY)
Special Precautions

When pulling disconnects, use your left hand (or your right hand if you are left handed) on the switch.

Face away from the panel or cabinet to prevent serious injury from arcing or explosion.
Lockout Policies and Procedures

Always use the regulation safety lock in ECPL.

Never lend your lock to anyone else.

Never borrow someone else’s safety lock

Carry your safety locks with you at all times while on the job.

Obtain extra safety locks for the job at hand before you start the lo/to.
Release the Stored Energy

**Stored energy includes:**
- Mechanical motion
- Gravity
- Stored mechanical energy
- Thermal energy

**Dissipate rotation**
- Control Gravity
- Control/release springs
- Dissipate thermal energy
- Release primary energies
Verify It

Be alert to danger. Verify the ECPL.

Are you absolutely sure that you have located all of the energy disconnect points?

Are you absolutely sure that the switches and electrical disconnects have opened?

Are you absolutely sure that you have taken care of all hazards from stored energy?
Verify It

Remove locks

Re-energize
  Before re-energizing equipment, check the machine and the immediate area around it.

  Inform appropriate personnel in the immediate area.

Test equipment operation