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Advanced Manufacturing  
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**Introduction to Safety – Unit Seven: Lockout / Tagout (LOTO) Safety**

*Chapter Reading*

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# Lockout/Tagout (LOTO) Safety

## Unit 7





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## Introduction to Safety – Unit Seven: Lockout / Tagout (LOTO) Safety

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#### **LEARNING OBJECTIVES:**

- Describe OSHA's requirements in a company's Hazardous Energy Control plan.
- Provide examples of power sources that supply energy to machines and equipment.
- Describe the difference between the log out and tag out procedure, devices that are used, and under which conditions.
- Provide examples of energy that need to be released before a LOTO procedure is performed, and how it is released.
- Describe the difference between *authorized*, *affected*, and *other employees*, and what their responsibilities are regarding LOTO.
- Define the following terms:
  - Isolation
  - Hot tap
- Provide compliance exception examples regarding situations when LOTO standards in a hazardous energy control plan are not required.
- Identify when training and retraining is required for authorized and affected employees.
- Explain the rules that are required for locks and keys which are used for LOTO.
- Describe the LOTO rules and procedures that are required when a shift change occurs.
- Explain inspection and audit regulations regarding LOTO and identify how and when they need to be conducted.
- List the steps followed in a LOTO procedure, and the order in which they should be performed.

#### **ALLOTTED LEARNING TIME:**

1.0 week



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#### Orientation

It is estimated that nearly 3 ½ million jobs at 1 million companies or shops require that workers in the United States service machines and equipment in various ways. For many of the service procedures that are performed, there is some potential for individuals being injured, especially if certain safety procedures are not followed. One type of precautionary safety measure that helps to prevent accidents and injuries is Lockout/tagout (LOTO). LOTO refers of specific procedures that helps to safeguard employees from unexpected energization or start-up of machinery or equipment, or the release of hazardous energy during service or maintenance activities. An example of energy being released and causing an accident is when a technician about to work on equipment assumes that electrical power has been removed when it has not been disconnected. The result could be that the equipment turns on and there is unexpected movement of a mechanical part which makes physical contact with the individual, harming them in some way, either severely or fatally.

The Occupational Safety and Health Administration (OSHA) estimates that about 120 fatalities, 28,400 lost workday injuries, and 31,900 non-lost workday injuries are prevented each year by properly using the procedures contained in OSHA's lockout/tagout standard. In addition to employees being harmed when energy is released unexpectedly, expensive equipment can be damaged as well.

Lockout/Tagout is a variety of safety procedures that are designed to prevent accidents and injuries caused by the unexpected release of energy from equipment when it is being repaired or maintained. An example of energy being released and causing an accident is when a technician about to work on equipment assumes that electrical power has been removed when it has not been disconnected. The result could be that the equipment unexpectedly turns on and moving mechanism makes physical contact with a part of the individual's body, harming them in some way either severely or fatally. OSHA (the Occupational Safety and Health Administration) estimates that about 122 fatalities, 28,400 lost workday injuries, and 31,900 non-lost workday injuries are prevented each year by properly using the procedures contained in OSHA's lockout/tagout standard. Moreover, it is estimated that nearly two percent of all workplace deaths can be prevented by the implementation of and adherence to these procedures.

#### Introduction

This unit covers the OSHA LOTO standard for service and maintenance of machines and equipment in which the unexpected energizing or start-up of the machine or equipment, or the release of stored energy, could cause injury or death to employees. OSHA establishes minimum performance requirements for the control of such hazardous energy through the Control of Hazardous Energy standard, found at 29 CFR 1910.147. This standard mandates that employers



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establish a program to ensure employees do not get injured by following the procedures they recommend. Also, the LOTO standard applies to all employees who work on or are around machines that may need to be serviced or maintained.

The topics that will be covered in this unit include:

1. Lockout and tagout is defined
2. Training of lockout and tagout procedures
3. Standard for locks and tags used in the LOTO procedure
4. Proper procedures for lockout/tagout
5. Procedures for uncommon and special lockout/tagout occasions, such as,
  - a. Outside contractors
  - b. Group lockout/tagout
  - c. Shift or personnel change



### 1. Lockout/Tagout (LOTO) Safety Defined

LOTO is required when any part of an employees body is in a danger zone if located in a position where he or she is exposed to a machine or equipment where energy is stored and could be released, or when in the path of moving parts during a machine operating cycle. Dangerous conditions include,

- Exposure to various types of energy that can be dangerous,
- unexpected start-up of equipment ,



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- release of stored, residual or potential energy
- a guard is removed or bypassed,
- body contact is made with the equipment's point of operation during a maintenance procedure.

Before any technician performs service 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.

Various types of energy sources include:

- Electrical
- Mechanical
- Hydraulic
- Pneumatic
- Chemical
- Water under pressure (steam)
- Force from Gravity

The procedure for isolating the energy source includes lockout and tagout steps.

- (1) **Lockout** – This is a set of safety procedures that prevent the flow of energy from a power source to a piece of equipment, therefore keeping it from operating. This procedure involves the placement of a lockout device such as a lock, block or chain on an energy-isolating device (i.e., a breaker lever, or valve), according to an established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed. (The act of blocking the flow of power from the power source to equipment.) The locking devices, which are provided by the employer, should be used only for lockout purposes.



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### Lockout/Tagout

- Referred to as LOTO
- Lockout is the act of blocking the flow of energy from the power source to the equipment
- Tagout is the act of warning (tagging) equipment that is being worked on – **DO NOT ENERGIZE**



(2) **Tagout** – This is the placement of a tagging device on the locking energy-isolating device, according to an established procedure. Its function is to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed. (The act of warning – tagging – equipment that is being worked on should clearly state: **DO NOT ENERGIZE**.)

Both the locks and the tags must be strong enough to prevent an unauthorized removal, and also to withstand harsh environmental conditions.

**Question:** What does “energized” mean?

**Answer:** Connected to an energy source or containing residual or stored energy.

**Note:** Examples of stored energy are a charged capacitor, a coiled spring, water held behind a dam, air pressure inside a tire.

## 2. Hazardous Energy Control Plan

An energy control program shall be developed, documented and used for the control of potentially hazardous energy when employees are engaged in production floor-related activities. The program must include the following elements:



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The employer must develop a Hazardous Energy Control Plan that includes:

- Written procedures
- Employee LOTO training
- Retraining program
- Inspection process

#### A. Written Procedures

The employer must develop and have available in writing, to all employees associated with equipment and machinery subjected to LOTO procedures, a written policy that takes into account the following items:

- What a LOTO procedure is and why it will be observed and enforced.
- Identify the individuals who have the authority to enforce the rules and procedures associated with LOTO.
- The specific steps for isolating, blocking and shutting down the machine or equipment.
- The specific procedural steps associated with the placement, removal and transfer of lockout/tagout devices, who is responsible for them.
- The specific requirements for testing equipment and machines to determine the effectiveness of the lockout and tagout devices, and other energy control measures if they are required.

#### B. Employee LOTO Training

The employer shall provide training to new employees to ensure that they have a working knowledge of the energy control program, which includes LOTO. This training provides employees with the knowledge and skills that are required for the safe application, usage, and removal of the energy source when performing maintenance on machines and equipment.

There are three categories of employees who work on equipment that is subjected to LOTO procedures. Based on their job requirements and responsibilities, OSHA requires that employees in each category receive different and specific types of training. These employees include:

**Authorized employee** – An authorized employee is a qualified person who locks out or tags out machines or equipment in order to perform service or maintenance on machines or equipment. These employees must know how to recognize



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hazardous energy sources, what type of energy they contain, and the amount. They must also know how to isolate and control the energy source to prevent accidents.

### Authorized Employee

Employee who:

- Locks out or tags out machines or equipment to perform servicing or maintenance.



Only authorized employees are permitted to disconnect equipment and machines from the energy source that are being serviced or maintained during a LOTO procedure.

An overview of responsibilities by authorized employees include:

### Authorized Employee Responsibilities

- Maintains equipment
- Services equipment
- Trained to use LOTO
- Recognizes hazardous energy sources
- Knows type and magnitude of the energy available in the workplace
- Knows methods and means necessary for energy isolation and control





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### Authorized Employee Responsibilities (Cont'd.)

- Repairs or services equipment as needed
- Ensures that all energy sources are locked out
- Tests equipment to verify residual energy is dissipated
- Places "Danger – Do Not Operate" tag on equipment

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Responsibilities also include:

- removing locks and/or tags following LOTO, and
- coordinating multi-shift repair actions.

### Authorized Employee Responsibilities (Cont'd.)

- Obtains assistance when necessary
- Removes locks and/or tags following LOTO
- Coordinates multi-shift repair



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**Affected employee** – An affected employee is a person whose job requires him or her to operate or use a machine or equipment on which service or maintenance is performed under lockout or tagout standard procedures. Affected employees also include individuals or whose job requires him or her to work in an area in which such service or maintenance is being performed, but not on the equipment or machine itself. They must also be acquainted with the purpose and procedures for energy control so that they fully understand the importance of not using a machine that is currently locked out or tagged out. Specific responsibilities of affected employees include:

### Affected Employee

**Employee who:**

- Operates/uses machine or equipment on which servicing/maintenance is being performed under LOTO
- Is working in affected area

  


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- notifying maintenance when equipment needs repair or adjustment,
- leaving all LOTO devices in place,
- verifying that equipment is safe to operate following LOTO, and
- following all safety rules while operating the equipment.

**Note:** An affected employee becomes an authorized employee when that employee's duties include performing service or maintenance on machines or equipment under a LOTO standard procedure.



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**Other employee** – An *other employee* is an individual who work in areas where the LOTO energy control procedures are used, but who is not a part of the process. However, it is important for these employees to understand the LOTO process and not to attempt to re-energize machines that are locked out or tagged out.

**Outside Contractors** – There are occasions where outside contractors are hired to perform the maintenance and servicing of equipment. Before they start any work, it is important that they are familiar with the LOTO policies and procedures of the company. If they are not, they should also receive training by the company from which they are performing their services. If there is not time to receive the training, they should be supervised by an authorized employee during every step of any maintenance project that requires LOTO procedures. If the contractors are qualified and use locks or tags during a maintenance operation, they inform the employer, who will then ensure that everyone affected will be notified.



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#### Review Questions

1. Which procedure is not a purpose of LOTO safety?
  - A. Prevent the unexpected equipment start-up
  - B. Prevent the accidental release of stored energy
  - C. Prevent injury or death of maintenance workers repairing equipment
  - D. None of the above
2. Which of the following examples are not considered to be an energy source?
  - A. Electricity
  - B. Hydraulic power
  - C. A weight that is elevated
  - D. Steam
  - E. None of the above
3. A safety procedure that blocks the flow of power from the power source to equipment is called \_\_\_\_\_.
  - A. lockout
  - B. tagout
  - C. de-energizing
  - D. Both A and B
4. An Energy Hazards Control program involves training that provides knowledge and skills required for \_\_\_\_\_.
  - A. safe inspection
  - B. proper usage of equipment
  - C. removal of energy controls (LOTO)
  - D. All of the above
5. A tagout device provides a warning that equipment is in a lockout condition and should not be energized.  
True or False
6. Employers must have a written policy that defines the lockout process.  
True or False
7. A person who locks out machines or equipment is an authorized employee.  
True or False



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8. Even when an affected employee's duties include performing basic service and maintenance on a machine, they do not become authorized employees.  
True or False
9. A/n \_\_\_\_\_ is an individual who work in areas where the LOTO energy control procedures are used, but who is not a part of the process.
- A. authorized employee
  - B. affected employee
  - C. other employee
  - D. contractor



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#### C. Retraining Program

Employers should provide **retraining** to their **employees** when the **following situations occur**:

- An employee's job assignment changes.
- There is a machine change.
- When equipment or the production process creates new hazards
- When there is a change in the LOTO energy control procedures.
- If the employee ever demonstrates that he or she does not appear to follow or fully understand the LOTO energy control safety policies or procedures.

Additional training requirements include:

### Training Requirements

- LOTO training
  - Affected employees – at least initially
  - Authorized employees – initially and at least annually
  - Affected and authorized – whenever changes are made to jobs procedures and when program deficiencies are noted

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#### D. Inspection Process

In addition to having a training program for their employees, the employer also has the responsibility to conduct inspections of the lockout/tagout energy control procedure. **Inspections** which are also referred to as **audits**, must be performed **annually** if the **procedure** is **conducted** at least **once per year**. The person conducting the inspection must not be an *authorized, effected, or other employee* involved in the LOTO procedures that are being inspected. There are various guidelines that must be followed when conducting inspections:

There are various guidelines that must be followed when conducting inspections:

- During the inspection, the inspectors observe the employer or authorized employee while they are checking to see if all employees are following the LOTO procedures.
- The inspector reviews the lockout responsibilities with all authorized employees and determines what they know by asking questions.
- The inspector helps to find and revise the process to correct deviations or inadequacies that are identified.
- Documentation involving the inspection is required, and the following information should be recorded for certification:
  - The specific machine on which the LOTO procedure was conducted.
  - Date of the inspection
  - Employees involved in the LOTO process during the inspection
  - The name of the person conducting the inspection

The employer must also have authorization and means to enforce compliance by administering appropriate disciplinary actions when necessary.

**Additional retraining** – Additional retraining shall be conducted whenever a **periodic inspection reveals inadequacies in the standard**, or whenever the employer has reason to believe that there are **deviations from the employees' knowledge** or use of energy control procedures.

**Question:** What should the training program consist of?

**Answer:** Each authorized employee shall 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.

**3. LOTO Device Requirements** – Devices associated with LOTO must meet required guidelines, such as:

**A. Capable of Being Locked Out** – An **energy-isolating device is capable of being locked out** if it has a **hasp** or other means of attachment to which, or through



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which, a lock can be affixed, or it has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

#### B. Lockout Devices – Lockout devices are used when the equipment is lockable.

In most situations, lockout devices are keys which must meet the following criteria:

- Keys shall be substantial enough to prevent removal by unauthorized employees without the use of excessive force or tools, such as bolt cutters or other metal cutting tools.
- Either keyed or combination locks can be used.
- They cannot be used for other purposes, such as for locking a toolbox for example.
- They must be durable enough to withstand heat, cold, humidity, or corrosive environments.
- Each lock must identify the name of the employee who installs it.

#### C. Tagout Devices – Tags are intended to warn that a lockout situation is currently underway. Tagout devices must have some requirements that are similar to lockout devices. These and other requirements include:

- A tagout device attachment shall be non-reusable and attachable by hand.
- The installer's name must be located on the front of the tag.
- The tags must be tough enough so that they cannot be removed easily.
- Each tag must be easy to read and understand, and must be standardized, which means they have the same print and format throughout the facility.
- The tag must be attached with a self-locking nylon cable that is environment-tolerant and able to withstand 50 pounds of pressure without breaking.
- Each tagout device shall include a legend, such as:
  - **Do Not Start.**
  - **Do Not Open.**
  - **Do Not Close.**
  - **Do Not Energize.**
  - **Do Not Operate.**



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### LOTO Device Guidelines

LOTO devices must be:

- Durable
- Standardized
- Substantial
- Identifiable

The image contains three illustrations: a yellow lockout station with multiple slots for locks, a red metal lock box with the text 'LOCK BOX' and 'A LOCK OUT FOR SAFETY', and a cartoon worker in a blue uniform applying a red lock to a grey electrical panel.

If the equipment being isolated is not lockable, at least the tags should be fastened to it. The tag should be fastened as close as possible to where the lock should be placed so that it is immediately obvious to anyone trying to activate the machine or equipment. Tagout devices are also permitted if the employer can safely

prove that the tagout device will provide employee protection equal to the lockout device by clearly prohibiting anyone from activating the machine or equipment.

### LOTO Devices

- Lockout devices are used when equipment is lockable
- Tagout devices are used when equipment is not lockable.
- Tagout devices include a legend



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#### Review Questions

10. When is retraining on Energy Control not required?
  - A. Where there is a change in a job assignment
  - B. When it is suspected that the knowledge of an employee is inadequate
  - C. When there is a machine change
  - D. Any of the above
  
11. If a machine runs only once per year, an energy control inspection does not need to be performed on an annual basis.  
True or False
  
12. The inspection of equipment energized at least once per year are performed by teams that include machine operators.  
True or False
  
13. What is an example of stored energy?
  - A. A coiled spring
  - B. A weight that is elevated
  - C. A capacitor with an electrical charge
  - D. All of the above
  
14. LOTO is always required when repairing or servicing equipment.  
True or False
  
15. Tagout devices can be used when the equipment is not lockable.  
True or False
  
16. Each lockout device shall include a legend, such as “Do Not Start”, “Do Not Open”, “Do Not Operate”, etc.  
True or False



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#### 4. Typical LOTO Procedures

Lockout/tagout procedures must only be performed by authorized personnel. To be authorized, they must fulfill the following requirements:

- Understand the scope of the lockout/tagout procedure, including why it is being conducted.
- Know how to perform the shutdown, which includes isolating the equipment from the power source, blocking, and securing machines and equipment.
- Knowing the rules regarding placing, removing and transferring locks, and being aware of who is responsible for them.
- Knowing how to test the machine to make sure it is locked out.

Depending on a particular machine and setup, there are different and specific LOTO steps that should be performed. The following example is a generic LOTO procedure that should be followed in a sequential order:

**Note:** Do not under any circumstances jeopardize an employee's life by not requiring LOTO – when in doubt, lock it out!

#### Step 1 – Preparing for a Shutdown

Before an authorized employee shuts down the machine or equipment, he or she must perform an initial hazard analysis. This individual must use the information obtained do determine:

- The type and amount of energy involved
- The hazards associated with the energy involved, and being confident that all sources of energy have been considered. .
- The methods and means to control the energy involved

#### Step 2 – Performing a Shutdown

To perform the shutdown of the equipment,

- The authorized employees need to notify the affected employees that the shutdown procedure will be commencing.
- Locate all energy sources that power the equipment (some machines have more than one power source).
- Follow the procedures to shut down the machine according to the specifications of the manufacturer.

An orderly shutdown is necessary to avoid potential hazards to employees that could occur if something was done incorrectly.



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**Typical LOTO Procedures**

- Perform shutdown
  - Locate all energy sources
    - Steam
    - Hydraulic
    - Pneumatic
    - Electrical
    - Spring-loaded
    - Weight-loaded



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### **Step 3 – Isolating Equipment or Machines from the Power Source**

An authorized employee isolates (or removes) the power source from the equipment or machine. Depending on the type of power source, this isolation is done in a certain way, such as:

- Pulling a plug to remove electrical power
- Throwing Main Disconnects or Main Circuit Breakers to shut off the electricity
- Closing a valve to prevent the flow of a fluid
- Bleeding a line to reduce air pressure
- Placing a block in the equipment to prevent a mechanism from moving.

### **Step 4 – Safe release of Stored Energy**

Any residual energy that is stored must be released, disconnected, retrained, or rendered safe in some other way. Examples of stored energy include:



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- A capacitor with an electrical charge
- A coiled spring
- A sealed storage tank that is under hydraulic pressurize
- An energized heating element that is at an elevated temperature
- A crane that has a heavy object hoisted above ground level

#### **Step 5 - Verification of the Isolation**

Before starting any servicing or maintenance procedures on the equipment that will be locked out or tagged out, the authorized employee should attempt to restart the machine to confirm and guarantee the it has been isolated from the power source, and that there is no residual stored energy that remains.

#### **Step 6 – Apply the Lockout and Tagout Devices**

Using the designated lockout device, the authorized employee should lock the energy isolation device in a safe or the off position, and the tag should also be placed and secured at the same location.

If several technicians or an entire crew are needed to work on one machine that requires a LOTO process, each one must apply his or her own lockout device. The reason for this requirement is that it prevents any accidental start-ups while another technician may still be working on the equipment.

A lockout/tagout hasp with multiple holes is designed for attaching several locks.

Authorized employees may never use the lock of another technician that is designated for LOTO, and should never loan their lock to another employee as well. One member of the crew should be appointed and given the responsibility for the entire crew, and is expected to make sure that all of the members of the group are safe during lockout.

If the maintenance on the machine is not completed during one shift but is continued by technicians on the following shift, the replacement technician must apply his or her lock during the shift change before authorized employees being relieved remove their locking devices.

#### **Step 7 – Perform the Maintenance Procedure**

During the maintenance and servicing of the equipment, the lockout and tagout devices should remain in place. However, whenever it is necessary to remove them to test or position the machine, the following actions should be taken:

- The machine should be cleared of any tools and materials that were used during the servicing.



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- Make sure that there are no personnel inside the machine.
- Remove the lockout/tagout devices from where they are attached to the energy isolation source.
- Energize the machine to test its operation or to place it in a home position.
- After the testing or positioning is completed, de-energize the equipment and repeat the other LOTO procedure.

### Step 8 – Removal of Lockout and Tagout Devices

After completing the service or maintenance procedures and before the power is restored, the lockout and tagout devices can be removed. However, before doing so, the following procedure set forth by OSHA should be taken by authorized employees:

- Remove all tools and materials from the equipment and surround area that were used during the maintenance procedure
- Ensure that all of the employees are clear and at a safe distance from the machine.
- Restore energy to the machine by removing the locking devices and tags.
- Notify all employees that the lockout procedure has been completed and that the machine or equipment is operational and can be restarted.

### Typical LOTO Procedures (Cont'd)

- **Isolate equipment**
  - Apply LOTO devices
  - Safely release stored energy
  - Verify equipment is isolated
- **Perform maintenance/work**
- **Re-energize to check work**
- **Remove LOTO devices**



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**Question:** Can you effectively isolate all energy sources from the equipment being worked on?

**Answer:** Isolate? No. Control? Yes.



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View the following URL to learn about LOTO:

<https://www.wisc-online.com/learn/career-clusters/stem/iau15708/the-lockouttagout-procedure>

**Question:** What responsibilities do maintenance technicians have concerning lockout/tagout?

**Answers:**

- Complete proper LOTO procedures.
- Remove locks from isolation devices.
- Lockout/tagout equipment prior to beginning work.

### How to Perform LOTO

- Follow company safety procedures
- Refer to procedures on how to lockout specific equipment
- Keep everyone informed when equipment is being repaired or serviced
- Stay alert
- Use common sense

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#### Review Questions

17. The lockout procedure involves just turning a machine off and unplugging it before performing maintenance.  
True or False
  
18. Before starting work on a machine that has been locked out, an authorized employee must confirm and verify that it has been isolated from the energy source.  
True or False
  
19. When a group lockout is required, only one crew member is given the primary responsibility of the crew.  
True or False
  
20. There must be communication and coordination between workers involved with a LOTO maintenance procedure when a shift change occurs.  
True or False
  
21. When several technicians are needed to work on one machine that requires the LOTO process, one person from the crew is designated to apply his or her locking device.  
True or False
  
22. When several technicians are needed to work on one machine that requires the LOTO process, one person from the crew is designated to apply his or her locking device.  
True or False



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#### 5. LOTO Exceptions

OSHA establishes minimum performance requirements for the control of hazardous energy through the Control of Hazardous Energy standard, found at 29 CFR 1910.147, which includes lockout/tagout procedures. However, there are exceptions, such as:

##### A. Lock Removal Exceptions

The removal of a locking mechanism can only be done by the authorized employee who installed it. However, if this individual is not available when the locking device needs to be removed for some important reason, the employer may direct its removal under the following conditions.

### Lock Removal

- Only by the employee who applied the device
- If not possible the EMPLOYER may direct its removal **IF**:
  - Verified that Employee who applied the device is not at the facility
  - All reasonable efforts to contact the employee and inform him that his locks are to be removed
  - Ensure that the employee has this knowledge before he resumes work

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##### B. LOTO Exceptions – LOTO is not required under the following circumstances:

- Work where hazardous energy does not exist.
- Work on cord-controlled devices, since the male end of a plug is normally unplugged and no need for a guard exists.
- *Hot tap operations* where shutdown is not feasible (i.e., a plant with boilers is not subject to LOTO if, by following LOTO procedures, the operation of the plant as a whole will be adversely affected).

**Note:** *Hot tap* refers to the procedure used in repair, maintenance and service activities that involve welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections or equipment. It is commonly used to replace or add sections of pipeline



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without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

- Activities performed during routine or normal production processes, such as:
  - Printing press – when routine adjustments must occur, the equipment does not have to be locked out. However, it is a good idea to have a second employee near the energy source or disconnect to shut down the equipment while adjustments are being made.
  - Minor tool changes and adjustments, and other minor servicing activities that take place during normal production operations, are not covered by this 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 that provide effective protection.

### LOTO Exceptions

- Hazardous energy does not exist
- Cord-controlled devices
- Limited hot tap operations
- Routine/normal production processes
  - Printing press
  - Minor tool changes and adjustments

**C. Compliance Exceptions** – When equipment requires replacement, renovation or overhaul, employers should invest in making the equipment lockable. However,

the employer need not document the required procedure for a particular machine or piece of equipment, when all of the following conditions exist:

- 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.



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- The machine or equipment has a single energy source, which can be readily identified and isolated.
- The isolation and locking out of the energy source will completely de-energize and deactivate the machine or equipment.
- The machine or equipment is isolated from that energy source and locked out during service or maintenance.
- A single lockout device will achieve a locked-out condition.
- The lockout device is under the exclusive control of the authorized employee performing service or maintenance.
- The service or maintenance does not create hazards for other employees.
- The employer, in utilizing this exception, has had no accidents involving the unexpected activation or re-energizing of the machine or equipment during service or maintenance.

**D. Non-Industrial Exceptions** – The **Hazardous Energy Control Plan** applies to all employees who **service** and/or **conduct maintenance** on **potentially hazardous equipment**. This **policy does not** apply to the following:

- construction, agriculture, and maritime employment;
- installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering;
- exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by OSHA regulations; and
- oil and gas well drilling and service.



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- Employees servicing and/or conducting maintenance
- Not applicable to:
  - Construction, agriculture, and maritime
  - Electric utility and installations
  - Oil and gas well drilling and servicing

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- Servicing Operations
  - Hazardous energy exists and/or unexpected start-up could occur  
(Either of these could harm an employee)
  - Guard removed or bypassed
  - Body contact with equipment
  - Body in a danger zone



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#### Review Questions

23. The authorized employee who applies the lockout device is the only person who can ever remove it.  
True or False
24. The term \_\_\_\_\_ refers to the procedure used in repair, maintenance and service activities that involve welding on a piece of equipment (pipelines, vessels, or tanks) under pressure.
- A. Duct work
  - B. Hot tap
  - C. Guard removal
  - D. Lockless
25. Hazardous Energy Control plans are not required by \_\_\_\_\_.
- A. maritime maintenance worker
  - B. oil and gas drilling platforms
  - C. electric utility companies
  - D. All of the above
26. Which situation requires a LOTO safety procedure?
- A. A hot tap procedure is performed
  - B. Adjustments are made to a printing press.
  - C. Tool changes and routine adjustments are made during normal production operations.
  - D. When a part of the body is placed in harm's way of a moving machine part.
27. It is possible to isolate all types of manufacturing equipment from their energy source.  
True or False



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#### Summary

It is important that a company abide by Hazardous Energy Control Plan regulations and understand that improper use of LOTO is a major cause of industrial fatalities and must be taken seriously. If employees intentionally violate LOTO rules, appropriate disciplinary actions need to be taken to avoid future incidents. Annual inspections need to be conducted to ensure that the written hazardous energy control program is followed.

OSHA establishes specific training requirements for LOTO. Every employer is required to provide training in accordance with these regulations. One of their most significant challenges is to follow the requirements of the training and the retraining function, both when deficiencies are noted and on an annual basis for authorized employees.

### Summary

- It is important that a company lives up to its regulatory responsibility.
- Improper use of LOTO is a cause of industrial fatalities and must be taken seriously.
- Program requirements include
  - Annual review of program
  - Training program
  - Appropriate disciplinary action for violators

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#### Unit 7 Chapter/Exam Questions

1. OSHA \_\_\_\_\_ that the employer establishes a program consisting of energy control procedures.
  - a. recommends
  - b. requires
  - c. suggests
  - d. None of the above
2. A tagout tag \_\_\_\_\_.
  - a. warns employees to not restore energy to the equipment
  - b. must be applied by hand
  - c. Must state “Do not operate” or something similar
  - d. All of the above
3. LOTO procedures are developed by \_\_\_\_\_.
  - a. equipment manufacturers
  - b. OSHA
  - c. The company that operates the equipment
  - d. Any of the above
4. Lockout/Tagout procedures prevent \_\_\_\_\_ while service is performed on a machine.
  - a. energizing equipment
  - b. start-up
  - c. the release of stored energy
  - d. All of the above
5. If a power source cannot be locked out, the \_\_\_\_\_.
  - a. equipment cannot be repaired
  - b. equipment must be repaired when no employees are in the building
  - c. authorized employee may be allowed to use tagout alone
  - d. equipment must be changed to so that it accepts a lock
6. Tagout is the placement of a locking device that isolates the equipment from an energy source to prevent start-up.
  - a. True
  - b. False



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7. The \_\_\_\_\_ step should be performed before the others.
  - a. lockout
  - b. tagout
  - c. service
  - d. maintenance
  
8. The Hazardous Energy Control Plan applies to all employees who \_\_\_\_\_ potentially hazardous equipment.
  - a. operate
  - b. service
  - c. are in the vicinity of
  - d. All of the above
  
9. A Hazardous Energy Control Plan policy does not apply to \_\_\_\_\_ employment.
  - a. construction
  - b. electric utilities
  - c. maritime
  - d. All of the above
  
10. Affected employees \_\_\_\_\_.
  - a. operate equipment that may be locked out
  - b. work in areas where lock/out tagout is used
  - c. stay clear of equipment while it is locked out
  - d. All of the above
  
11. When routine adjustments are made to a printing press, \_\_\_\_\_.
  - a. LOTO procedures are required
  - b. it is acceptable not to do LOTO if a second employee is present to monitor the process
  
12. LOTO is not required if equipment with a cord-controlled device is unplugged.
  - a. True
  - b. False
  
13. \_\_\_\_\_ refers to welding a connection to a pipeline vessel, or tank that is under pressure, without the interruption of service for gas, air, and other fluids.
  - a. Hot plugs
  - b. Plug/tap
  - c. Hot tap
  - d. Pressure tap



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14. LOTO is not required during a hot tap operation.
  - a. True
  - b. False
  
15. LOTO is not required where \_\_\_\_\_.
  - a. energy exists
  - b. there may be an unexpected start-up
  - c. a guard is removed
  - d. None of the above
  
16. An \_\_\_\_\_ employee is a person who operates a machine on which service or maintenance is being performed.
  - a. affected
  - b. authorized
  - c. alternate
  - d. All of the above
  
17. An authorized employee must receive training \_\_\_\_\_.
  - a. initially
  - b. annually
  - c. Both a and b
  - d. None of the above
  
18. *Isolating* equipment in a LOTO procedure refers to \_\_\_\_\_.
  - a. removing equipment from the energy source
  - b. releasing stored energy from the source
  - c. Both a and b
  - d. moving the equipment being worked on to a different location
  
19. There are multiple sets of keys issued to qualified maintenance personnel for the lock used in a LOTO job.
  - a. True
  - b. False
  
20. When is employee retraining conducted?
  - a. There is a change in job assignments
  - b. There is a change that creates a new machine hazard
  - c. it is discovered that an employee has forgotten proper energy control procedures
  - d. Any of the above



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21. Tagout devices can be used in place of lockout devices when the equipment is not lockable.
  - a. True
  - b. False
  
22. An example of a machine with stored energy is \_\_\_\_\_.
  - a. hydraulic equipment with an elevated car on a hoist
  - b. a charged capacitor
  - c. an air compressor tank with residual pressure
  - d. All of the above
  
23. A coiled industrial spring is not considered an energy source.
  - a. True
  - b. False
  
24. Inspection of energy control procedures must be performed annually, even if a machine runs only once per year.
  - a. True
  - b. False
  
25. An annual LOTO inspection should list \_\_\_\_\_.
  - a. the date of the inspection
  - b. the name of the inspector
  - c. the names of employees included in the inspection process
  - d. the machine or equipment that is inspected
  - e. All of the above



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### **Review Question Answers**

1. D
2. E
3. A
4. D
5. True
6. True
7. True
8. False
9. C
10. D
11. False
12. False
13. D
14. False
15. True
16. False
17. False
18. True
19. True
20. True
21. False
22. False
23. False
24. B
25. D
26. D
27. False



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## **Introduction to Safety – Unit Seven: Lockout / Tagout (LOTO) Safety**

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