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# Control of Hazardous Energy (Lockout/Tagout)

- *29 CFR 1910.147*



# Objectives

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- In this course, we will cover the following:
  - The need for energy control procedures
  - Methods of lockout/tagout
  - Employer's responsibilities
  - Employee training needs
  - Inspection requirements



# Lockout /Tagout

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29 CFR 1910.147

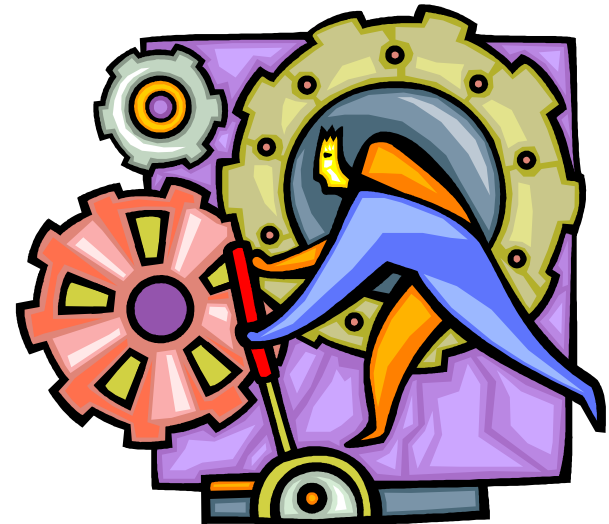
- Technically known as the **Control of Hazardous Energy**
  - Control of energizing, starting, or stored energy in machinery or equipment which could cause injury to employees



# Scope

§1910.147(a)(1)

- Covers the ***servicing*** and/or ***maintenance*** of machines where the unexpected start-up or release of stored energy could cause injury
  - Construction
  - Installation and set-up
  - Adjustment or maintenance
  - Inspection
  - Modification
  - Routine service



# Scope

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§1910.147(a)(2)

- Servicing and/or maintenance which takes place during normal production operations is covered only if:
  - Employee is required to remove or bypass a guard or other safety device; **or**
  - Employee is required to place any part of their body into the point of operation or where an associated danger zone exists during a machine operation.

(cont...)

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# Scope

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§1910.147(a)(2)

- Exception

- Minor tool changes and adjustments, **and** other minor servicing activities which take place during normal production operations, are **not covered** if they are:

- Routine,
- Repetitive, **and**
- Integral

...to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

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# Does Not Cover

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§1910.147(a)(1)

- Construction, agriculture, maritime
- Installations under exclusive control of the 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
- Oil and gas drilling and servicing

(cont...)

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# Does Not Cover

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§1910.147(a)(2)

- Normal production operations
- Work on cord and plug connected equipment where plug is under exclusive control of employee performing servicing/maintenance
- Hot tap operations, under special conditions





# Definitions

§1910.147(b)

- **Authorized employee**
  - An employee who locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment.
- Lockout or tagout is used by these employees for their own protection.

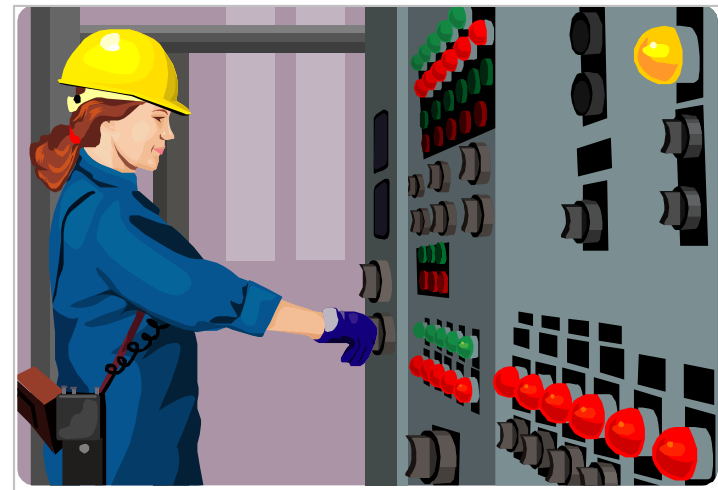


# Definitions

§1910.147(b)

- **Affected employee**

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



# Definitions

§1910.147(c)(7)

- **All other employees**

- Other employees whose work operations are, or may be, in area where energy control procedures may be utilized

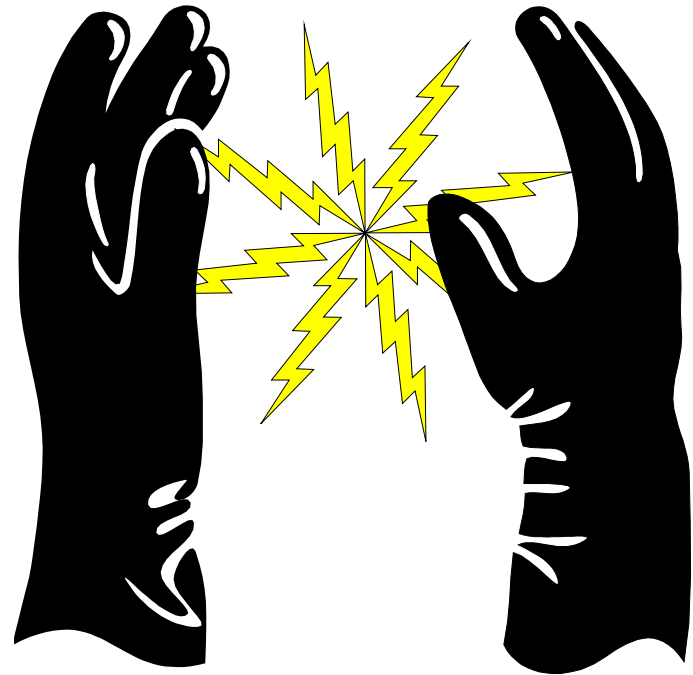


# Definitions

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- **Energy source**

- Mechanical
- Hydraulic
- Chemical
- Pneumatic
- Electrical
- Thermal



# Energy Control Program

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§1910.147(c)(1)

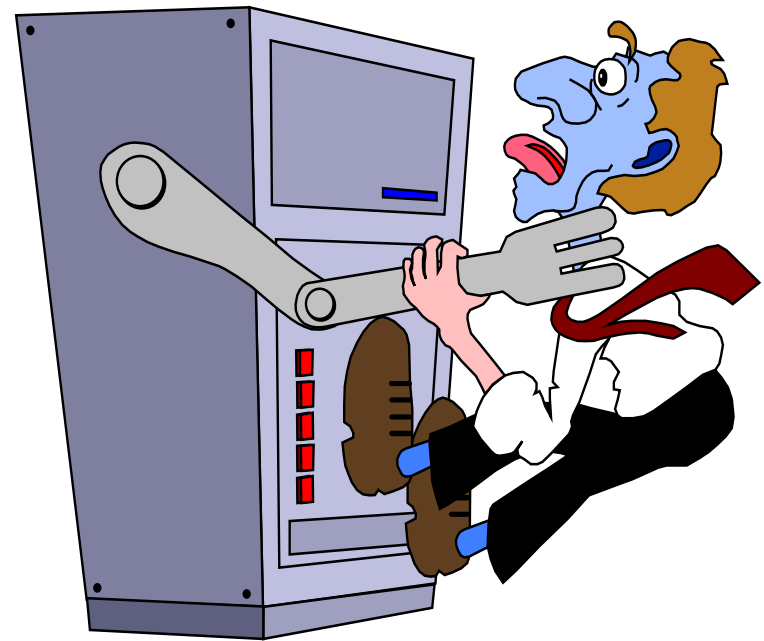
- The employer shall establish a program consisting of:
  - Written energy control procedures
  - Employee training
  - Periodic inspections



# Energy Control Program

§1910.147(c)(2)

- If an energy isolating device is not capable of being locked out, the employer's energy control program shall utilize a tagout system.



# Energy Control Program

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§1910.147(c)(3)

- When a tagout device is used on an energy isolating device which is capable of being locked out
  - Tagout device shall be attached at the same location
  - Must provide equivalent safety



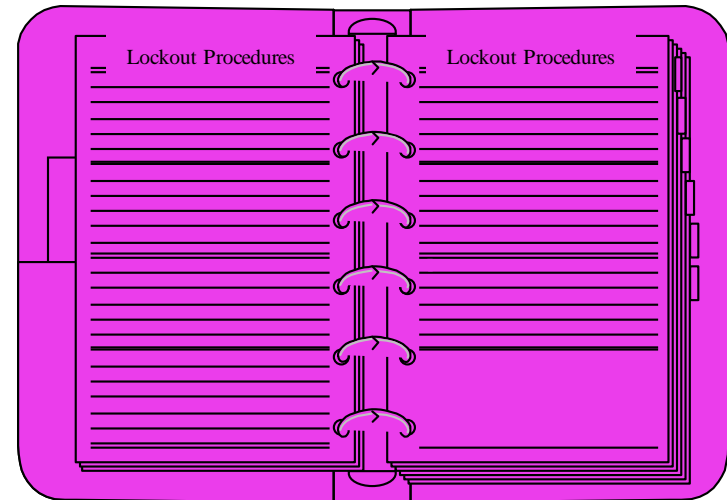
# Energy Control Procedure

§1910.147(c)(4)

- Procedures

- Shall be developed, documented and utilized for the control of potentially hazardous energy
- Shall clearly and specifically outline techniques to be utilized to control hazardous energy

(cont...)





# Energy Control Procedure

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§1910.147(c)(4)

- Energy control (LOTO) procedure
    - Statement of intended use of procedure
    - Steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy
    - Steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them, **and**
    - Requirements for testing machine/equipment to determine and verify effectiveness of LOTO devices and other energy control measures
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# Energy Control Procedure

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§1910.147(c)(4)

## ● Exception

- Machine/equipment has no potential for stored/residual energy after shut down
- Machine/equipment has a single energy source which can be readily identified and isolated
- The isolation and locking out of energy source will completely deenergize/deactivate the machine/equipment
- Machine/equipment is isolated from that energy source and locked out during servicing or maintenance

(cont...)

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# Energy Control Procedure

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§1910.147(c)(4)

- Single lockout device will achieve a locked-out condition.
  - Lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
  - Servicing/maintenance does not create hazards for other employees; ***and***
  - Employer has had no accidents involving the unexpected activation/reenergization of the machine/equipment during servicing/maintenance.
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# Materials and Hardware

§1910.147(c)(5)

- Provided by employer
- Singularly identified
- Only device(s) used
- Not used for other purposes

(cont...)



# Materials and Hardware

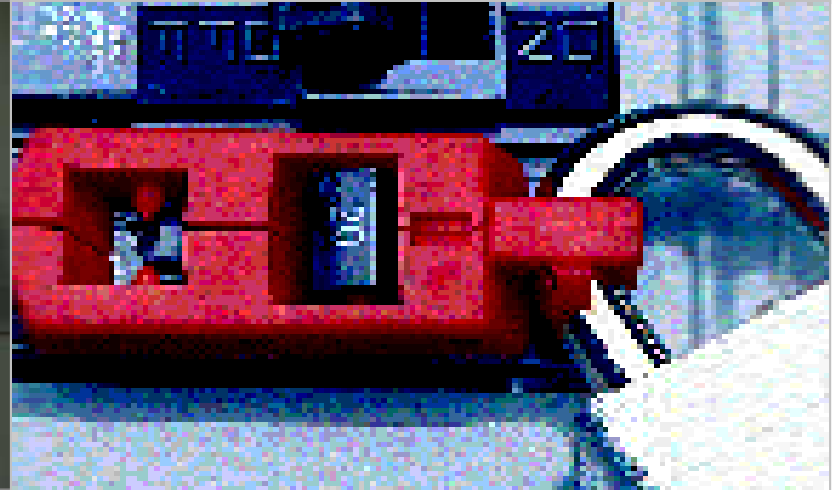
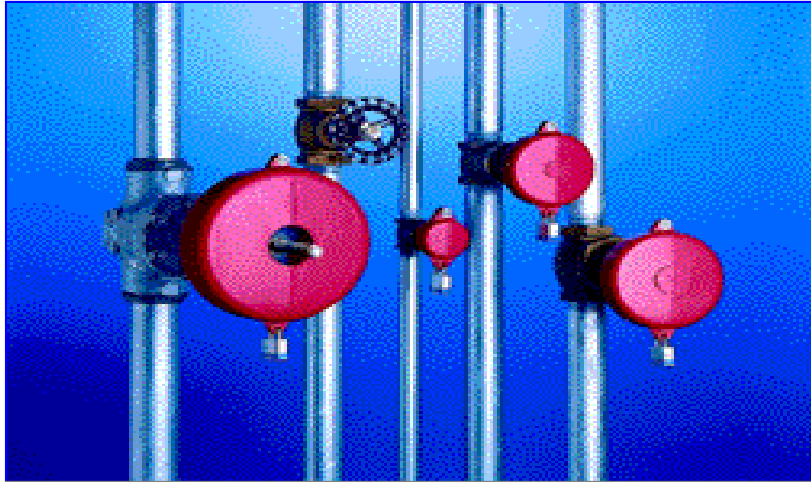
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§1910.147(c)(5)

- Durable
- Standardized
- Substantial
- Identifiable



# Types of Devices



# Is this identifiable?

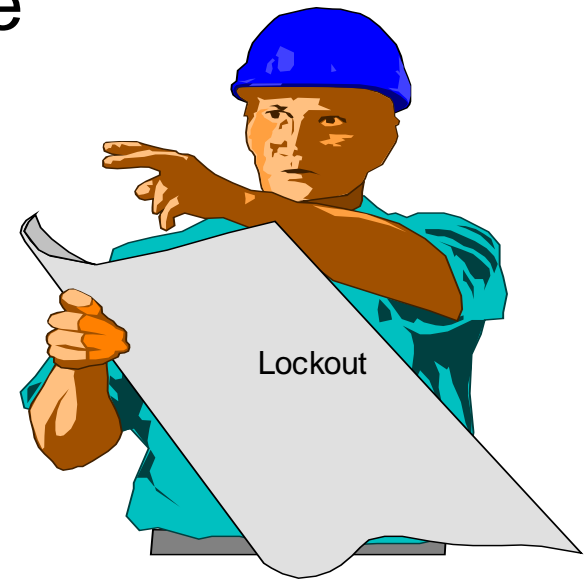
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# Periodic Inspection

§1910.147(c)(6)

- Conducted at least annually to ensure procedure and requirements are followed
- Performed by authorized employee other than the one(s) using the procedure
- Designed to correct identified deficiencies or inadequacies





# Periodic Inspection

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§1910.147(c)(6)

- Employer shall certify that periodic inspection has been performed.
  - **Lockout inspection**
    - Must review each *authorized* employee's responsibilities under the energy control procedure
  - **Tagout inspection**
    - Must review each *authorized and affected* employee's responsibilities under the energy control procedure, **and**
    - Additional training requirements of 1910.147(c)(7)(ii)
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# Training and Communication

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§1910.147(c)(7)

- **Authorized employee**

- Recognition of hazardous energy sources
- Type and magnitude of energy in workplace
- Methods and means for energy isolation and control





# Training and Communication

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§1910.147(c)(7)

- **Affected employee**
  - Purpose and use of the energy control procedure



# Training and Communication §1910.147(c)(7)

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- **All other employees**

- Procedures for lockout and tagout
- Prohibition of restarting or reenergizing machines that are locked or tagged out



# Training and Communication §1910.147(c)(7)(ii)

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- Tagout systems

- Warning devices only; does not provide physical restraint
- Must not be removed/bypassed/ignored
- Must be legible and understandable
- Must withstand environmental conditions
- May evoke false sense of security
- Must be securely attached



# Training and Communication §1910.147(c)(7)

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- Retraining for authorized and affected employees
    - Change in job assignments
    - Change in machines, equipment or processes that present new hazards
    - Change in energy control procedures
    - Whenever periodic inspections reveal, or employer has reason to believe, there are deviations in employee knowledge or use of procedures
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# Is this correct?

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# Energy Isolation

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§1910.147(c)(8)

- Lockout or tagout shall be performed only by the ***authorized employees*** who are performing the servicing or maintenance.



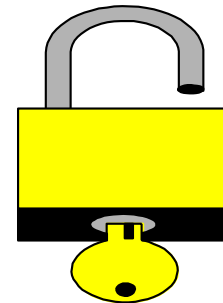


# Notification of Employees

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§1910.147(c)(9)

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

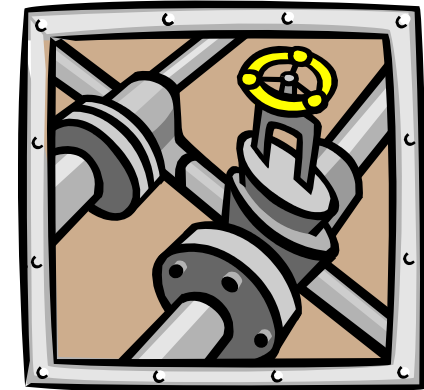


# Application of Control

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§1910.147(d)

- Sequence for lockout/tagout procedures
  - Preparation for shutdown
  - Machine or equipment shutdown
  - Machine or equipment isolation
  - LOTO device application
  - Release of stored energy
  - Verification of isolation
  - Release from LOTO
  - Inspection of machine or equipment work area
  - Location of employees



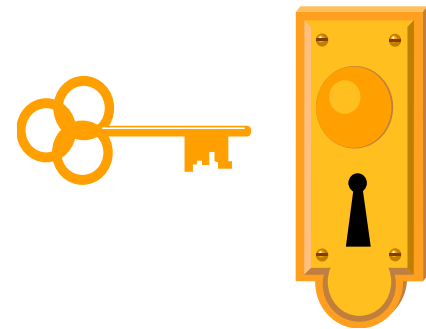


# Preparation for Shutdown

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§1910.147(d)(1)

- Know the types and amounts of energy that it powers
- Know the hazards of the energy to be controlled
- Know method or means to control energy





# Machine/Equipment Shutdown §1910.147(d)(2)

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- Turn off or shut down using established procedures
- Orderly shutdown to avoid additional or increased hazard(s) to employees as a result of the equipment stoppage



# Machine/Equipment Isolation

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§1910.147(d)(3)

- All energy isolating devices needed to control energy shall be physically located to isolate the machine or equipment from the energy source(s)



# Lockout/Tagout Application

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§1910.147(d)(4)

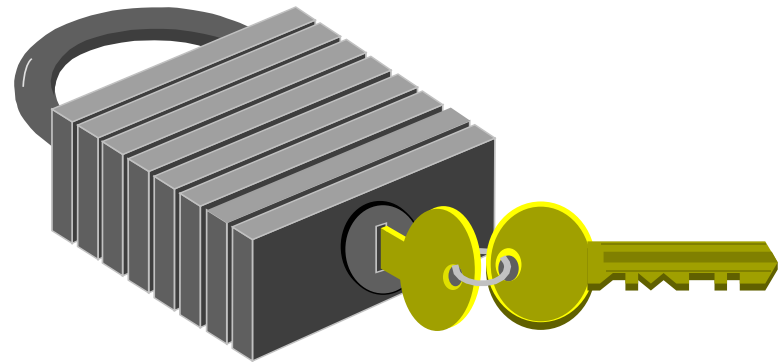
- Shall be affixed to each energy isolating device by authorized employees
  - **Lockout devices**
    - Shall be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position
  - **Tagout devices**
    - Shall be affixed in a manner indicating that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited
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# Stored Energy

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§1910.147(d)(5)

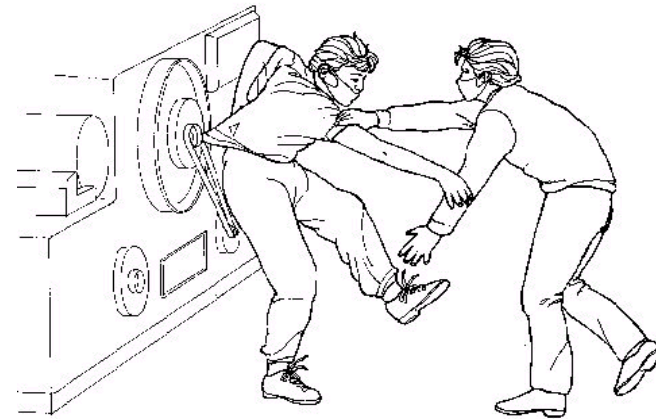
- After application of device, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.



# Verification of Isolation

§1910.147(d)(6)

- Prior to starting work on machines or equipment that have been locked out/tagged out
  - Authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished







# Release from Lockout/Tagout

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§1910.147(e)

- Before LOTO devices are removed and energy restored
    - Work area inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact
    - Work area shall be checked to ensure that all employees have been safely positioned or removed
    - Affected employees notified that LOTO devices are removed
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# LOTO Devices Removal

§1910.147(e)(3)

- Each LOTO device shall be removed from each energy isolating device by the employee who applied the device
  - **Exception:** When authorized employee who applied the LOTO device is not available, device may be removed under the direction of the employer



# LOTO Devices Removal

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§1910.147(e)(3)

- Employer removal of LOTO device
    - Specific procedure shall include:
      - » Verification by employer that authorized employee who applied device is not at the facility
      - » Making all reasonable efforts to contact authorized employee to inform them that LOTO device has been removed, **and**
      - » Ensuring that authorized employee has this knowledge before they resume work at facility
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# Testing or Positioning of Machines §1910.147(f)

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- When LOTO devices must temporarily be removed for testing/positioning:
  - Clear machine or equipment of tools and materials
  - Remove employees from area
  - Remove lockout/tagout device
  - Energize and proceed with testing or positioning
  - Deenergize and reapply energy control measures



# Outside Personnel

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§1910.147(f)(2)

- Contractors and the on-site employer must exchange lockout/tagout information
- On-site employees must understand and comply with rules used by the contractor



# Group Lockout/Tagout

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§1910.147(f)(3)

- When servicing and/or maintenance is performed by a group, they shall utilize a procedure which affords employee protection equivalent to a personal LOTO device.





# Group Lockout/Tagout

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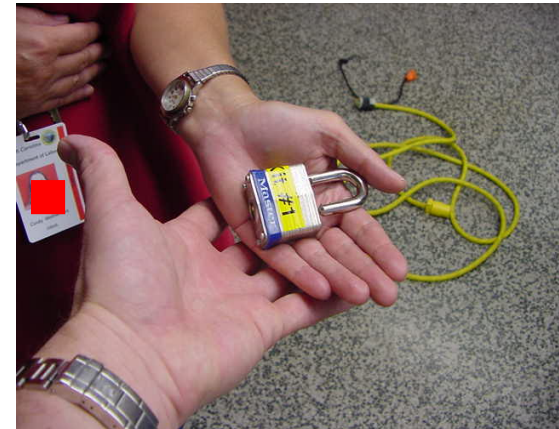
§1910.147(f)(3)

- Primary responsibility is vested in an authorized employee
  - Authorized employee must ascertain exposure status of group members
  - If more than one crew is involved, a coordinator shall be designated
  - Each authorized employee shall use a personal LOTO device and remove device when they stop working on machine/equipment
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# Shift/Personnel Changes

§1910.147(f)(4)

- Specific procedures used during shift/personnel changes to ensure the continuity of LOTO protection
  - To minimize exposures from the unexpected energization or start-up of the machine/equipment, or release of stored energy





# Sample LOTO Program

- Typical minimal lockout procedures
  - A non-mandatory guideline to assist employers and employees in complying with the requirements of this section

LOCKOUT/TAGOUT PROCEDURE		Page 1
Organization:	Facility:	Date:
Location:		
<b>SCOPE:</b> This procedure covers the necessary safety precautions and procedures for servicing and maintenance of machines and equipment in which the unexpected energization or start up, or release of stored energy could cause injury to employees.		
<b>PURPOSE:</b> This procedure covers the minimum requirements for lockout and/or tagout of energy isolating devices to protect employees from hazardous energy including electrical, mechanical, hydraulic, pneumatic, or other energy. It will be used as a facility-wide general procedure for isolating all potentially hazardous energy (lockout/tagout) before employees perform any servicing and maintenance activities where unexpected energization, start up or release of stored energy could cause injury. This procedure, when used in conjunction with the specific information recorded on the attached pages of this procedure, provides the necessary information for lockout/tagout.		
<b>PROCEDURE:</b> <ol style="list-style-type: none"><li>1. Only trained, authorized employees can lockout/tagout.</li><li>2. All affected and other employees working in or entering work areas where lockout/tagout is performed must be trained.</li><li>3. Determine all energy isolating devices requiring lockout/tagout to ensure effective control of hazardous energy.</li><li>4. Determine the type and magnitude of the energy and required controls.</li><li>5. Notify all affected employees of the plans to lockout/tagout.</li><li>6. Shutdown the equipment/process by normal procedures.</li><li>7. Locate the necessary energy isolating device(s) to equipment process and operate them to isolate energy sources and affix lockout/tagout devices.</li><li>8. Follow all stored or residual energy and take appropriate measures to ensure it does not reaccumulate. Affix lockout/tagout device as necessary.</li><li>9. Verify energy isolation and relief of stored energy after ensuring employees are not exposed and before beginning work. After start buttons are activated, press the stop button.</li><li>10. Perform the servicing and maintenance.</li><li>11. To safely restore machines, equipment or process to normal production operations, remove all guards and safety devices, remove all personnel, remove all tools and equipment.</li><li>12. Notify affected employees.</li><li>13. Remove lockout/tagout devices (by authorized employee installing lockout/tagout devices).</li></ol>		
<b>LOCKOUT/TAGOUT DEVICE REMOVAL BY EMPLOYER:</b> When it becomes necessary to remove the lockout/tagout device of an employee who is unavailable at the facility, it can be done only by the employer and then under a special, approved procedure, as follows: _____		
<b>GROUP LOCKOUT/TAGOUT:</b> When a lockout/tagout job involves numerous lockout/tagout devices and many employees, a group lockout/tagout procedure may be used. A separate, special written procedure or permit is required.		
<b>CONTRACTORS:</b> All contractors must comply with the lockout/tagout procedures specified by the site employer and employees of the employer must not violate the contractor lockout/tagout.		
Procedure Prepared By:	Date:	Procedure Authorized By: Date:



# Summary

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In this course, we discussed:

- The need for energy control procedures
- Methods of lockout/tagout procedures
- Employer's responsibilities
- Employee training needs
- Inspection requirements



**Thank You for Attending!**

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**Final Questions?**

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