

# Lockout/Tagout

BWC Division of Safety & Hygiene

Brian Zachetti, CSP

# Standard Implementation

Implemented in January 1990 -  
In response to:

122	Fatalities
28,400	Lost Workday Injuries
32,000	Non-Lost Workday Injuries

Caused Annually By Improper Shutdown of Machinery

The following accidents, taken from a NIOSH report entitled, *Guidelines for Controlling Hazardous Energy During Maintenance and Servicing*, are typical of the hazards of common industrial equipment and machines and demonstrate the protective function of the Standard 29 CFR Part 1910.147

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<u>Incident</u>	<u>Lockout/Tagout Standard Provision That Protects From The Hazard</u>
<p>1. An employee was removing paper from a waste hogger. The hogger had been shut down, but the conveyor feeding the hogger had not been. The employee climbed onto the machine, fell onto the conveyor, was pulled into the hogger opening and was crushed. There was no energy control procedure at this operation.</p>	<p>Document and Implement an effective energy control procedures - Part 1910.147(c)(4)</p>
<p>2. An employee was partially inside an asphalt-mixing machine, changing its paddles. Another employee, while dusting in the control room, accidentally hit a toggle switch that caused the door of the mixer to close, striking the first employee on the head and killing him. Electrical switches to activate the machine were not de-energized and air pressure to move the doors was not shut off.</p>	<p>Isolate equipment from energy sources -Part 1910.147(d)(3)</p>

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<b>Incident</b>	<b>Lockout/Tagout Standard Provision That Protects From The Hazard</b>
<p>3. An employee was setting up a vacuum-forming machine for a run of violin cases. He leaned over the press and accidentally activated the starting switch. His head was crushed between an air cylinder and the frame hogger opening. There was no energy control procedure at this operation.</p>	<p>Document &amp; implement an energy effective control procedures - Part) 1910.147(c) (4)</p>
<p>4. An employee was cleaning scrap from beneath a large shear when a fellow employee hit the control button, activating the blade. The blade came down and decapitated the employee</p>	<p>Isolate, lockout/tagout or otherwise disable all potential hazardous energy sources before attempting any repair, maintenance or servicing – Part 1910.147(c)(2)</p>

# Mahoning Valley Real Life Cases

- Food Mixer
- Screw Conveyer
- Coil Slitter Exit End
- Extrusion Mill

# When Do I Lockout?

- This standard applies to the control of energy during servicing and/or maintenance of machines and equipment.

# What Is Servicing/ Maintenance?

- Constructing
- Installing
- Setting up
- Adjusting
- Modifying
- Servicing
- Tool changes
- Machine lubrication
- Part replacement

# Normal Production 1910.147(a)(2)(ii)

- This standard does not cover normal production operations. It covers servicing and/or maintenance, which takes place during normal production operations, if:
  - An employee is required to remove or bypass a guard or other safety device;
  - An employee is required to place any part of their body into the point of operation.



# Minor Servicing Exemption

- Exception to paragraph (a)(2)(ii): Minor tool changes and adjustments, and other minor servicing activities, which 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 which provide effective protection.

# UAW - Analysis Of Weaknesses in Lockout Standard 1910.147

- Language is confusing and may be interpreted to say lockout is not required for routine maintenance tasks by claims that these are part of servicing during normal production operations.

# Lockout Vs. Minor Servicing Exemption

- Lockout/tagout provides the greatest level of protection and, whenever possible, should be used to protect employees from hazardous energy.
  - UAW view
  - Abuse Of minor servicing exemption
  - Identify tasks in your facility
  - Risk assessment

# Three Criteria for Minor Servicing Exemption

- You can use three specific criteria to determine if the minor servicing exemption would apply to a particular activity.

First, the activity must be conducted during normal production operations, i.e., while the machine or equipment is actually performing its intended production function.

# Three Criteria for Minor Servicing Exemption

- Second, the activity must be:
- Routine: The activity must be a regular course of procedure and be in accordance with established practices;
- Repetitive: The activity must be regularly repeated as part of the production process;
- Integral: The activity must be essential to the production process.

# 3 Criteria For Minor Servicing Exemption

- Third, if all of these apply:
- The employer must use alternative measures to provide effective protection from the hazardous energy;
- These alternative measures must enable the employee to safely perform the servicing task without being exposed to the unexpected energization or activation of the equipment, or the release of stored energy.

# Minor Servicing Questions

- Is the task short in duration?
- Does the task occur frequently during the shift?
- Is the task usually performed by operators, setup, service?
- Does the task involve extensive disassembly?
- Does the task represent predetermined cyclical activities?

# Minor Servicing Questions

- Is the task expected to occur regularly?
- Does the task minimally interrupt part of the production process?
- Does the task exist even when optimal operating levels are achieved?
- Does traditional lockout/tagout prohibit the completion of the task?



# ***LOCKOUT***

- The process of blocking the flow of energy from a source to a piece of equipment and keeping it blocked.

# Can I Use These As A Lockout Method?



# Energy Isolation Device

- A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

# Improper Lockout Procedures

**DANGER**

DO NOT put hands and fingers inside the machine while in operation.

A.

B.

Always perform a machine stop before locking out disconnects

REASON FOR LOCKOUT	ENERGY SOURCE	SAFETY MEASURE LOCATION	METHOD	CHECK	DEVICE	VIEW
Tool Changes/Set Ups and Minor Maintenance	Electrical	Key Located on the Operators Panel Box	Turn "Control Power" key to the off position and remove	Attempt to restart any power source on the machine	Key	A

Date: 9/7/16 Revision: 0

**DANGER**

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Reason For Lockout	Energy Source	Safety Measure Location	Method	CHECK	DEVICE	View
Tool Changes/ Set Up's/Minor Maintenance	Electrical	Lockout device on the operator's panel box	Depress the button and securely attach the lock	Attempt to restart any power source on the machine	Lock	A
			Remove material			

# Why You Can't Just Lock Out the Push Button or Switch

- Another employee enters the motor controller (motor starter) enclosure and manually closes the relay.
- The push button malfunctions.
- There is a failure rate of a relay or motor controller (e.g., defective spring; welded contacts).

# Why You Can't Just Lock Out the Push Button (continued)

- A machine jam occurs causing higher current in the motor circuit, resulting in the freeze-up of the controller relay contact parts because the current creates arcing, which in turn welds shut the relay's plunger-coil mechanism.

# Why You Can't Just Lock Out the Push Button (continued)

- A loose wire contacts the conduit or enclosure.
- Two wires short out inside a damaged conduit (e.g., vibration causes wires to rub and wear through the wire's insulation resulting in an electric short and bridging of the control circuit).
- Water, dirt, metal particles or other conductive foreign debris enters the control circuit enclosure causing the switch to operate because the material sufficiently bridges and closes the circuit, allowing current flow.

# ***TAGOUT***

- A warning not to restore energy. It is not a physical restraint but has the same effect as a lock does.

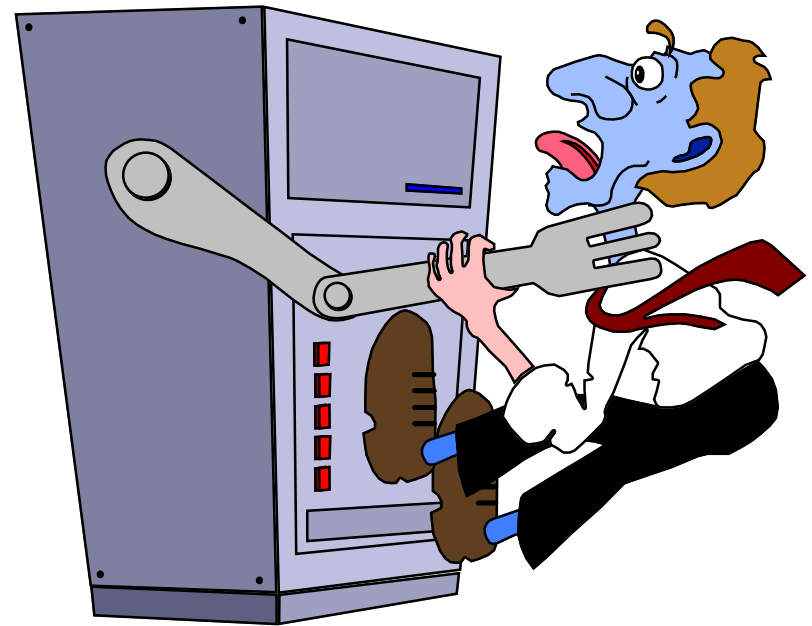


## II. List & Identify all Sources Of Energy

- Electrical
- Hydraulic
- Pneumatic
- Thermal
- Chemical
- Mechanical
- Cord & Plug Equip.
- Other Types

# III. Procedures For Each Piece Of Equipment

- Written procedures must be documented for each piece of equipment.
- If machinery or pieces of equipment are similar, just one procedure will cover all like pieces.



## Lockout / Tagout Energy Source Identification

Machine: CompressorDate: 12 - 30 - 97Location: Auto ShopDept.: Maintenance

Person Identifying Sources:

John Doe, Maintenance Supervisor

Type Of Energy	Yes	No	Method, Device or System Selected to De-energize. Quantity of Energy Source (i.e. Voltage, Velocity, PSI, etc.
Electrical	X		Close disconnect on wall behind unit & lockout. Check with tester. 480 Volts.
Hydraulic	X		Close valve on left end. Open pressure release valve below it. Allow pressure to escape(15 minutes). 150 PSI Lockout
Pneumatic (Air)	X		Shut valve on right end and open bleeder valve, lockout, wait 15 minutes for pressure to bleed down. 300 PSI
Chemical		X	
Thermal		X	
Mechanical		X	
Cord & Plug Connected		X	
Engulfment Hazard		X	
Other		X	



# Air Compressor








XYZ Company



Bureau of Workers' Compensation

Building:	STZ	Location:	STZ	Equipment #	123
LOCKOUT / TAGOUT DEVICES REQUIRED:			2	LOCKOUT POINTS:	2

<input checked="" type="checkbox"/> 2 QTY LOCKS 	<input checked="" type="checkbox"/> 1 QTY BALL VALVE DEVICE 				
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			<b>⚠ WARNING</b> Disconnecting equipment does not guarantee a complete lockout  <b>Perform Shutdown</b> 1) Notify affected personnel and others 2) Identify ALL energy sources 3) Perform normal shutdown procedure 4) Isolate power at main source 5) Lockout/tagout all energy sources 6) Attempt restart  <b>Release Stored Energy</b> 1) Drain valves, bleed off air, and eliminate hydraulic pressure 2) Ensure all energy is released  <b>Restore Power</b> 1) Account for all tools 2) Replace all machine guards 3) Remove all tags/locks 4) Reconnect all power sources 5) Notify affected personnel and others 6) Restart the machine
			
			

**Hazardous Energy Legend:**

									
ELECTRIC	PNEUMATIC	WATER	HYDRAULIC	MECHANICAL	CHEMICAL	GAS PRESSURE	CONTROL GRAVITY	THERMAL	ENGINE

ID	SOURCE	DEVICE(S)	LOCATION	METHOD	CHECK
E1	Operating Controls	No Device	On the front of the compressor	Depress E-stop button then power off the compressor with power button	Panel Is Off
E2 (480 3 Phase)	Electrical Disconnect	Lock	Sullair Main Disconnect Feed	Move disconnect left to off position and apply a lock.	Attempt to start using red power button
H1 (102 PSI)	Pneumatic Ball Valve	Ball Valve Lockout Device and Lock	Pneumatic Air Line Across From Compressor	Lock out the main air valve closest to the compressor before the green air filter, Lock out the bypass valve, bleed of excess	Attempt to use compressed air from the line.

## Safe Procedures for Energy Control Program 1910.147(c)(1)

- Employer shall establish a program consisting of:
- Steps for Shutting down all energy sources.
- Steps for all potentially hazardous stored or residual energy to be relieved, otherwise rendered safe.
- Steps for Placement, Removal & Transfer Of LO/TO Devices.
- Steps for testing to verify LO/TO.
- Training & Enforcement Policy.

# Verification of Isolation

## 1910.147(d)(6)

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

# *IMPORTANT TEST STEPS*

- ◆ Identify equipment which should be isolated
- ◆ Inform Affected employees
- ◆ Shut down equipment
- ◆ All potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.
- ◆ Lock . . . Tag . . . AND TRY!
- ◆ After work is completed, perform start up procedures and inform Affected employees

# V. Identify Different Personnel

- Authorized
- Affected
- Other





# *RESPONSIBILITIES OF AUTHORIZED*

- ◆ Have sufficient number of locks with lock identification, tags and keys to fully isolate all energy sources during maintenance or service of a machine or equipment.
- ◆ Properly apply these energy isolating devices, lock(s) and tag(s).
- ◆ Assure that all key(s) related to LOTO are properly controlled so that the locks cannot be removed without your knowledge.
- ◆ Understand and follow the procedures or the LOTO program.
- ◆ Be Responsible for following LOTO procedures that have been developed for specific equipment or machinery maintenance operations in your workspace.

# *RESPONSIBILITIES OF AFFECTED AND OTHER*

- ◆ Understand the purpose and importance of the LOTO program.
- ◆ Recognize when the LOTO procedure is being implemented in your facility.
- ◆ Make certain not to attempt startup or use of equipment that has been locked or tagged out.
- ◆ **SIMPLY:** Whenever there is a LOTO device in place on an energy isolating device, leave it alone and do not attempt to operate the equipment.

# Lockout Devices

## 1910.147 (c)(5)

- ◆ The **employer shall provide** locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware
- ◆ Lockout/tagout devices shall be:
  - a) Identifiable
  - b) Durable
  - c) The only device used for controlling energy
  - d) Not be used for other purposes
  - e) Standardized
  - f) Substantial



# Hardware

## 1910.147 (c)(5)

- ◆ Capable of withstanding the environment for the maximum period of time
- ◆ Tagout devices constructed and printed to withstand wet/damp locations
- ◆ Tags shall not deteriorate when used in corrosive environments (acid and alkali chemicals)
- ◆ Lockout/tagout devices shall be standardized by:
  - a) Color
  - b) Shape
  - c) Size
  - d) Print and format (tagout devices)

# Protective Materials & Hardware

## 1910.147 (c)(5)

- ❑ Lockout devices - prevent removal without use of excessive force (bolt cutters)
- ❑ Tagout devices - prevent inadvertent or accidental removal.
- ❑ Lockout/tagout devices indicate the identify of the employee applying the device(s).

# Protective Materials & Hardware

## 1910.147 (c)(5)

### □ Tagout attachment:

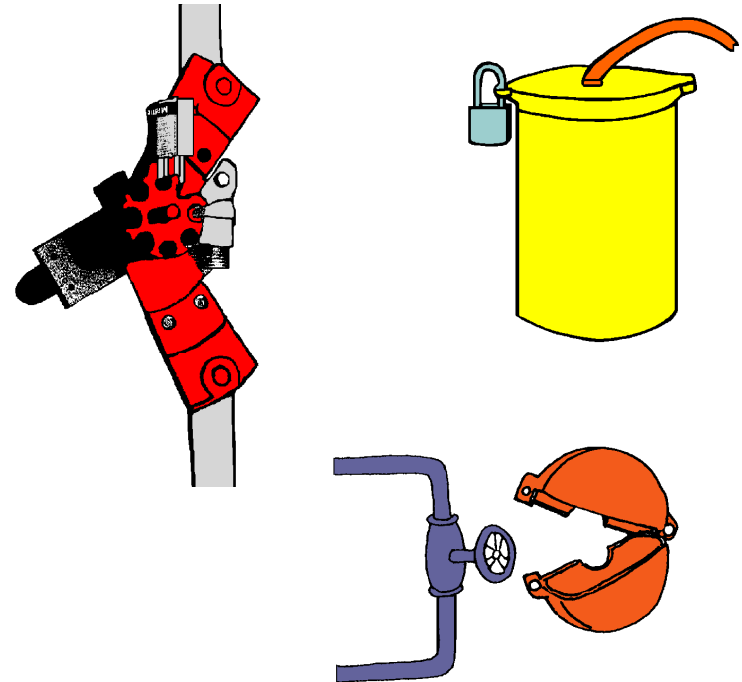
- a) non-reusable    b) attachable by hand
- c) self-locking    d) non-releasable
- e) unlocking strength  $\geq$  50 pounds

\*\* equivalent to an all environment-tolerant nylon cable tie

- Tagout devices include a legend such as the following: Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not

# VII. Training Of Authorized Employees.

- Types of Energy.
- Magnitude Of Energy Sources
- Locations & How to Lockout Energy Sources.
- Types of Devices to Be Used.



# VIII. Training Affected & Other Employees

- Purpose Of The Energy Control Program.
- Types & How to Identify Lockout Devices.
- To Understand That They Should Not Tamper With Any Devices Used In Lockout/Tagout Procedures.



# Shift or Personnel Changes

## 1910.147(f)(4)

- ❑ Specific procedures for shift or personnel changes including provision for 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.

## **X. Develop Procedures on how you will Communicate with Contractors on LO/TO.**

- Who
- What
- When
- Where
- How



# XI. Miscellaneous Items in Your Program.

- Procedures for removal of a lock when that person is not present.
- Notifying affected employees when locks are to be applied or removed.

# **XII. Group Lockout Procedures.**

Procedures on how you will handle more than one individual working on the same piece of equipment.

# XIII. Annual Inspection of Your Procedures.

- Date of Inspection.
- Machine or Process to review Identified.
- Names of persons involved in LO/TO.
- Name of person doing Inspection.
- Copy of Inspection kept on record.

# THE END - QUESTIONS?