



Part 85. Control of Hazardous Energy Sources

**Student Materials
MTI Level Two Compliance Course
Consultation Education and Training Division
Michigan Occupational Safety and Health Administration
Michigan Department of Labor and Economic Opportunity
www.michigan.gov/miosha
517-284-7720**



(Revised 02/24)



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Part 85. Control of Hazardous Energy Sources

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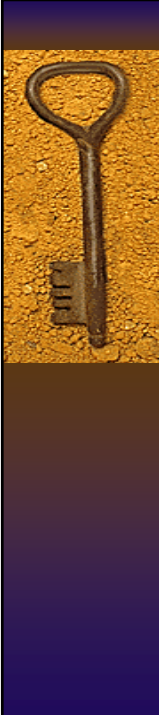


Objectives


1. Understand the provisions of Part 85 – The Control of Hazardous Energy Sources.
2. Define selected terms as it relates to lockout/tagout according to MIOSHA Standard.
3. Explain the three components of an energy control program.
4. Establish procedures for the application and removal of energy control.
5. Discuss additional requirements of Part 85.

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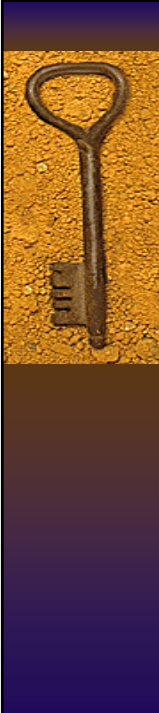


Warning: Graphic dramatization



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The Purpose of Lock Out / Tag Out

- ◆ Prevent the unexpected start-up or release of stored energy
- ◆ Reduce the number of fatalities and injuries
- ◆ Establish a program and develop procedures for controlling hazardous energy

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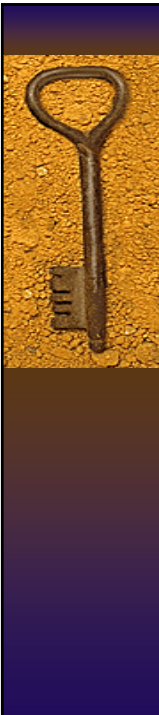
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Standard Layout (State Standard)

- ◆ Table of Contents
- ◆ Scope
- ◆ Application and Purpose
- ◆ Definitions
- ◆ Employer and Employee Responsibilities
- ◆ General Provisions
- ◆ Specific Requirements
- ◆ Maintenance Requirements

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Part 85. The Control of Hazardous Energy Sources

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R 408.18501. Scope

Rule 8501

- 1) Minimum requirements for employee protection during repair, maintenance, and associated activities - unexpected, unintended motion, energization, start-up, or release of stored energy.
- 2) Part 85 - concurrent application with other standards containing lock-out provisions. Where conflict exists the general industry standard prevails.


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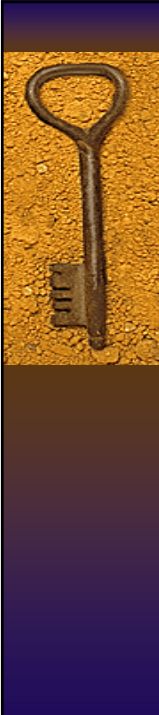
Horizontal vs. Vertical Standards

- ♦ Horizontal Standards
 - General standards covering all industries and/or equipment where the vertical standard is silent.
 - Examples:
 - Part 1 – General Provisions
 - Part 2 – Walking Working Surfaces
 - Part 7 – Guards for Power Transmission
 - Part 380 - Occupational Noise Exposure



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Horizontal vs. Vertical Standards

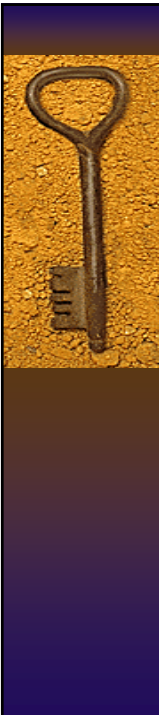
- ♦ Vertical Standards
 - Industry or machine specific
 - Examples:
 - Part 27 – Woodworking Machinery
 - Part 44 – Foundries
 - Part 62 – Plastic Molding

What is Part 85?



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1910.147 (a)(1) Scope

(i) This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy.

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1910.147 (a)(1) Scope


(ii) Does not cover:

- (A) Construction, agriculture and maritime
- (B) Installations under exclusive control of electric utilities - generation, transmission, distribution, communication, and metering (Part 86)
- (C) Work on, near, or with electrical utilization installations (Part 40)
- (D) Oil and gas drilling/servicing



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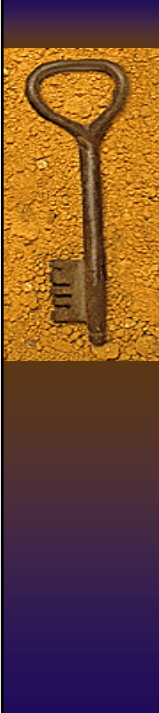
1910.147 (a)(2) Application

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

What about equipment that is out of service for production reasons and not for maintenance or repair?

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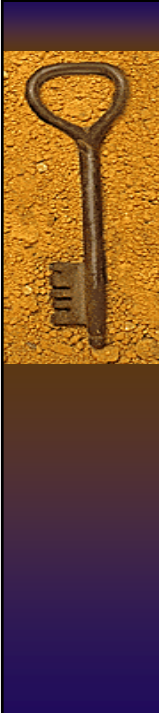


1910.147 (a)(2) Application

(ii) Normal production operations are not covered by this standard. Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if:

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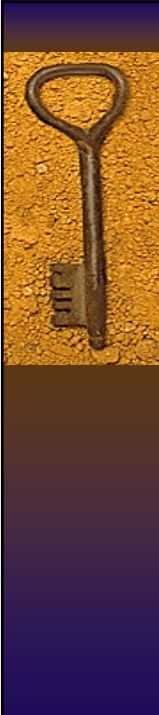
(a)(2)(ii) Application

(A) An employee is required to remove or bypass a guard or other safety device; or

(B) 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 (point of operation) or where an associated danger zone exists during a machine operating cycle.

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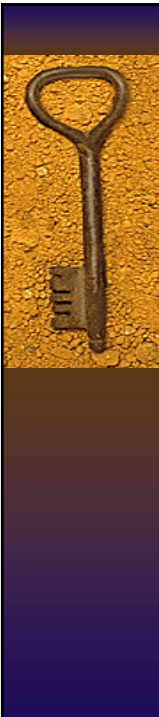


(a)(2) Application

Note: 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.

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(a)(2) Application

Exceptions:


- ♦ Minor tool changes - adjustments - and other minor servicing operations if they are routine, repetitive, and integral to the use of the equipment;

however,

alternative protective measures and a risk assessment are required for this exception as outlined in MIOSHA GISHD Instruction COM-07-3

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(a)(2) Application

Be aware...

Simply training the employee to stay away from hazardous machine components is not effective alternative employee protection

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Minor Servicing Exception

(CPL: Pg. 3-25)

Some activities are properly classified as “servicing and/or maintenance” activities, but they are minor in nature and performed during normal production operations.

- lubricating,
- draining sumps,
- servicing filters,
- making simple adjustments, and
- inspecting for leaks and/or malfunction



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Minor Servicing Exception

(CPL: Pg. 3-25)

Minor “servicing and/or maintenance” activities:

- Do not require extensive disassembly of the machinery/equipment
- Can be accomplished safely with effective production-mode safeguards, (Subpart O)

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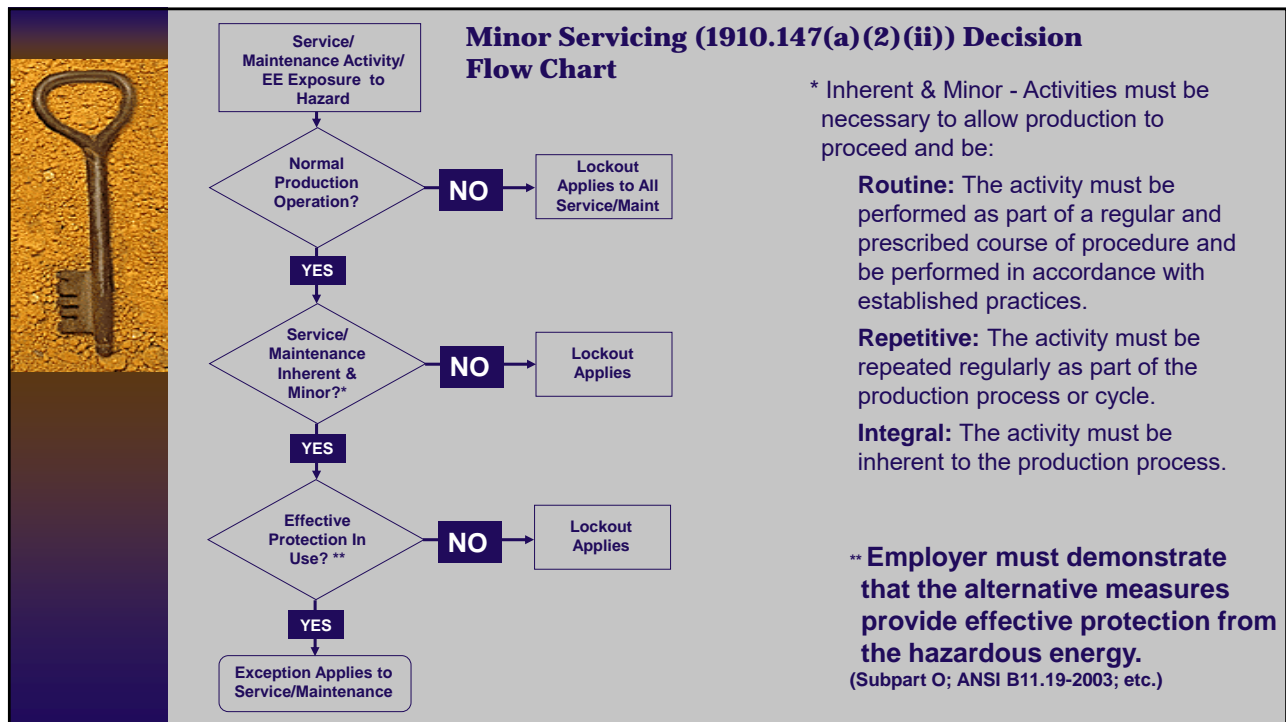


Activity

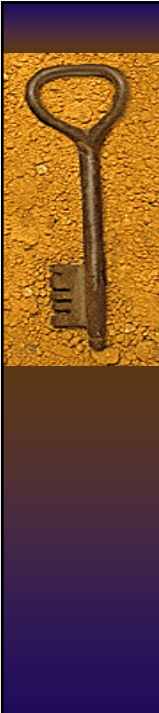
- ◆ Partial Exception Worksheet

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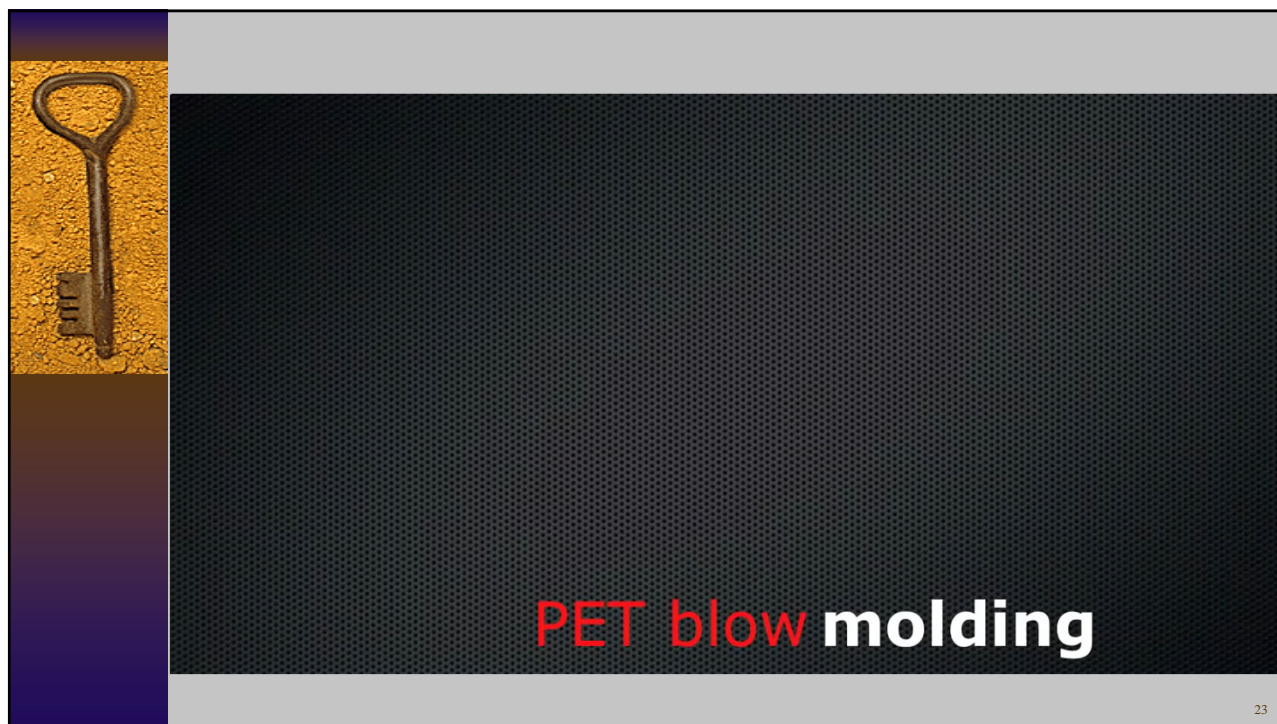
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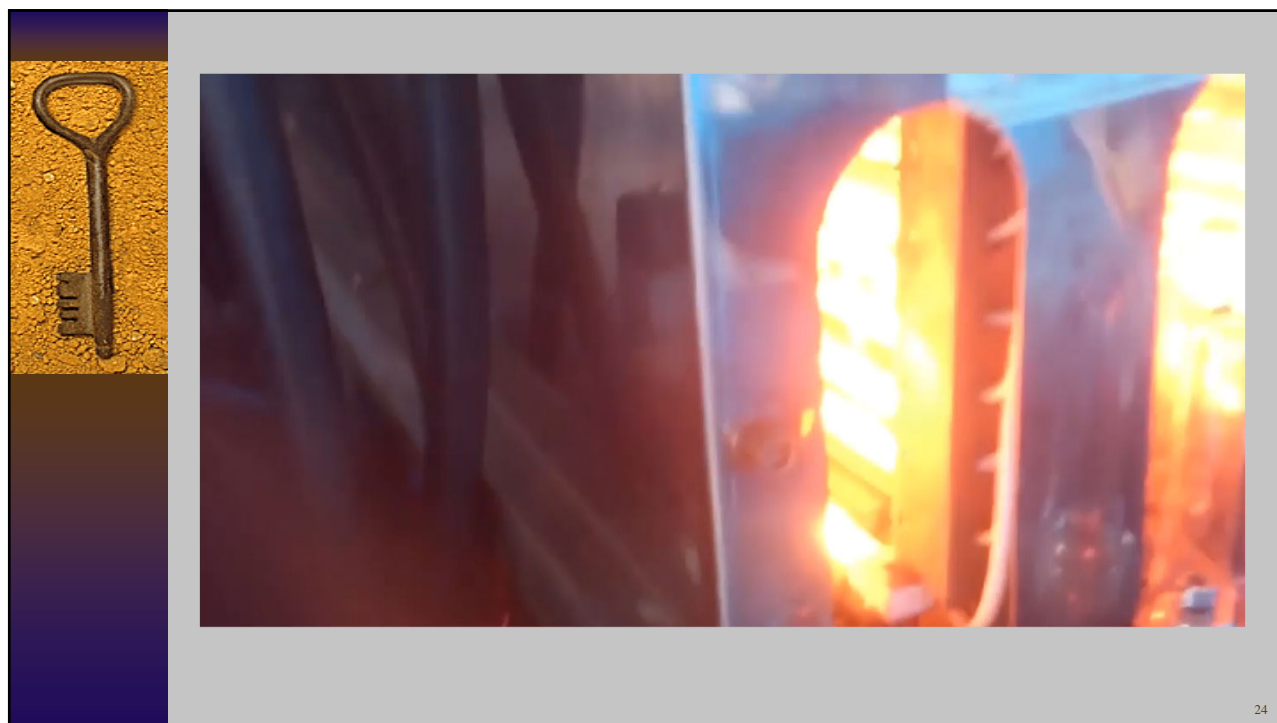
Activity

- ◆ Blow Molding Example Activity

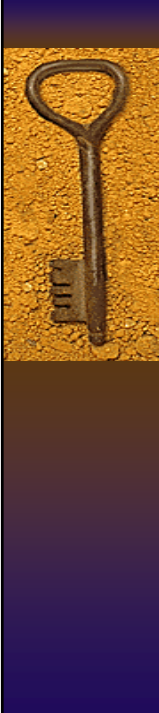
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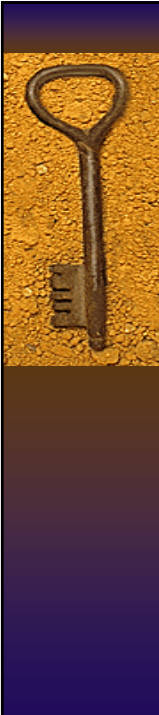
(a)(2)(iii) Application

- ◆ (iii) This standard does not apply to the following:
- ◆ (A) Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.



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(a)(2)(iii) Application

(B) Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that

- (1) continuity of service is essential;
- (2) shutdown of the system is impractical;
and
- (3) documented procedures are followed,
and special equipment is used which will provide proven effective protection for employees.

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1910.147 (a)(3) Purpose

- (i) Employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employees.
- (ii) When other standards in this part require the use of lockout or tagout, they shall be used and supplemented by the procedural and training requirements of this section.

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1910.147

(b) Definitions applicable to this section

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(b) Definitions applicable to this section

Affected employee

An employee whose job requires him/her to operate or use a machine or equipment on which servicing, or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

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(b) Definitions applicable to this section

Authorized employee


A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

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What type of employees are these?



LOTO applies to all workers performing these tasks, regardless of their title.


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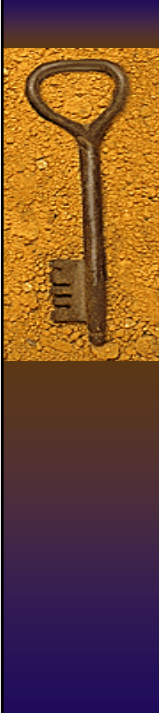
(b) Definitions applicable to this section

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 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.



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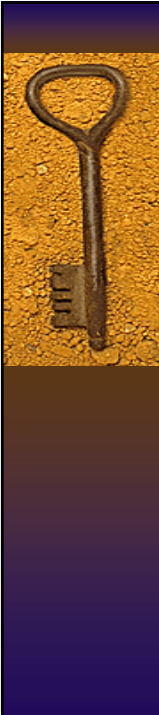
(b) Definitions applicable to this section

Energized. Connected to an energy source or containing residual or stored energy.



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(b) Definitions applicable to this section

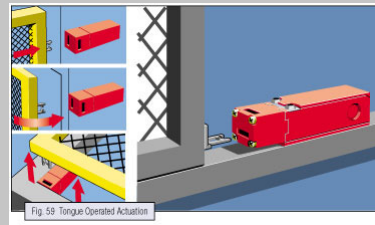
Energy isolating device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; 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.

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Energy Isolating Devices?



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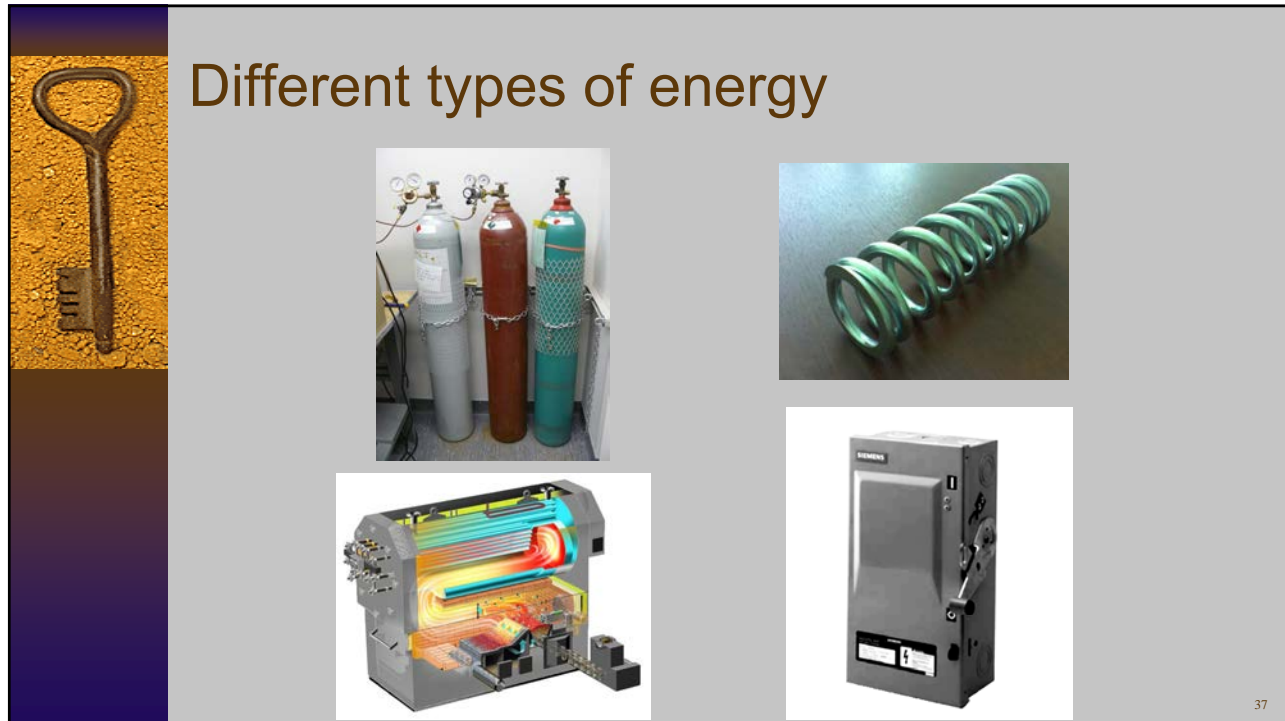
(b) Definitions applicable to this section

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

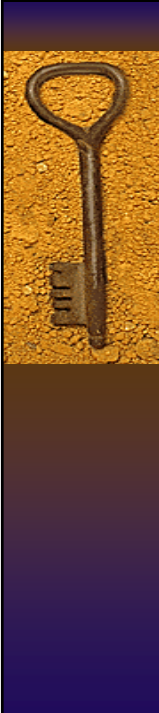


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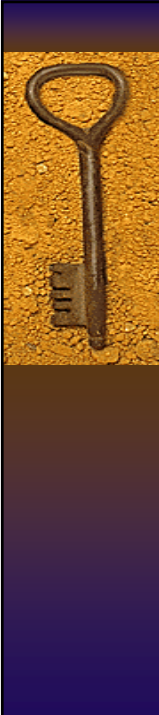


(b) Definitions applicable to this section


Hot tap. A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

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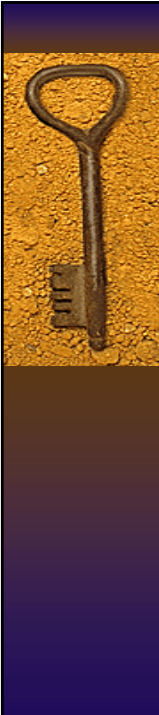
Hot Tap



STOP/SYSTEM®

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(b) Definitions applicable to this section

Lockout.

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


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(b) Definitions applicable to this section


Lockout device.
A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds



Bolted Slip Blind



Blank/Blind Flange



Lock out applied

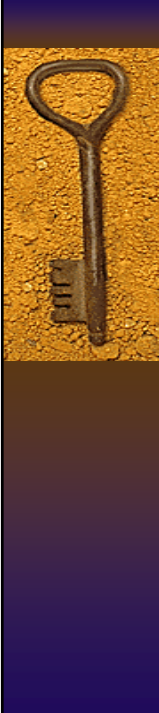
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Acceptable locks




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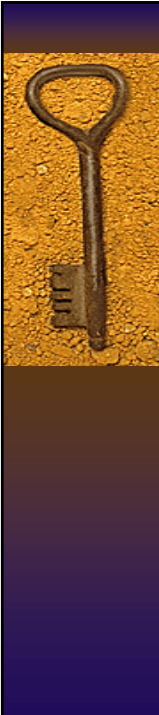
(b) Definitions applicable to this section

Normal production operations. The utilization of a machine or equipment to perform its intended production function.



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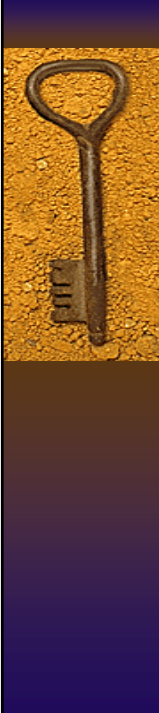


(b) Definitions applicable to this section

Servicing and/or maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or start-up of the equipment or release of hazardous energy.

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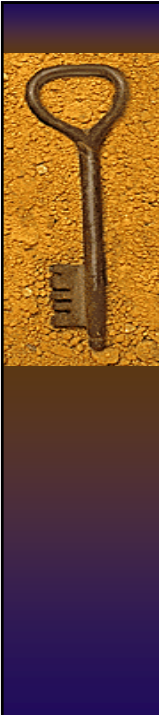


(b) Definitions applicable to this section

Setting up. Any work performed to prepare a machine or equipment to perform its formal production operation.

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(b) Definitions applicable to this section

Tagout. The placement of a tagout device on any energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.


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(b) Definitions applicable to this section

Tagout device. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.



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1910.147 (c) General

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His first day was his last...



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|-------------------|--|--------------|------------------|
| Emphasis: | L.Foodpro, N.Svep, L.Fordift, N.Amputate | Close Case: | 12/03/2013 |
| Related Activity: | Type Accident | ID 509130 | Safety Health |

Case Status: CLOSED

| Violation Summary | | | | | | |
|--------------------|----------|-----------|--------|-------|---------|-----------|
| | Serious | Willful | Repeat | Other | Unclass | Total |
| Initial Violations | 9 | 2 | | 1 | | 12 |
| Current Violations | 9 | 2 | | 1 | | 12 |
| Initial Penalty | \$52,000 | \$140,000 | \$0 | \$0 | \$0 | \$192,000 |
| Current Penalty | \$33,000 | \$77,000 | \$0 | \$0 | \$0 | \$110,000 |
| FTA Amount | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |

| Violation Items | | | | | | | | | |
|-----------------|-------|---------|------------------|------------|------------|----------|----------|-------|-------------------------|
| # | ID | Type | Standard | Issuance | Abate | Curr\$ | Init\$ | Fta\$ | LastEvent |
| 1. | 01001 | Serious | 19100037 A03 | 02/08/2013 | 03/07/2013 | \$2,000 | \$6,000 | \$0 | I - Informal Settlement |
| 2. | 01002 | Serious | 19100135 A01 | 02/08/2013 | 03/07/2013 | \$2,000 | \$4,000 | \$0 | I - Informal Settlement |
| 3. | 01003 | Serious | 19100147 C05 I | 02/08/2013 | 08/01/2013 | \$7,000 | \$7,000 | \$0 | I - Informal Settlement |
| 4. | 01004 | Serious | 19100147 C06 I A | 02/08/2013 | 08/01/2013 | \$7,000 | \$7,000 | \$0 | I - Informal Settlement |
| 5. | 01005 | Serious | 19100147 C07 I A | 02/08/2013 | 08/01/2013 | \$7,000 | \$7,000 | \$0 | I - Informal Settlement |
| 6. | 01006 | Serious | 19100212 A01 | 02/08/2013 | 03/07/2013 | \$2,000 | \$4,000 | \$0 | I - Informal Settlement |
| 7. | 01007 | Serious | 19100219 C04 I | 02/08/2013 | 03/07/2013 | \$2,000 | \$6,000 | \$0 | I - Informal Settlement |
| 8. | 01008 | Serious | 19100242 B | 02/08/2013 | 03/07/2013 | \$2,000 | \$6,000 | \$0 | I - Informal Settlement |
| 9. | 01009 | Serious | 19100305 B01 II | 02/08/2013 | 03/07/2013 | \$2,000 | \$5,000 | \$0 | I - Informal Settlement |
| 10. | 02001 | Willful | 19100147 C04 I | 02/08/2013 | 03/07/2013 | \$70,000 | \$70,000 | \$0 | I - Informal Settlement |
| 11. | 02002 | Willful | 19100147 C07 I B | 02/08/2013 | 03/07/2013 | \$7,000 | \$70,000 | \$0 | I - Informal Settlement |
| 12. | 03001 | Other | 19100303 G01 | 02/08/2013 | 03/07/2013 | \$0 | \$0 | \$0 | I - Informal Settlement |

Accident Investigation Summary


Summary Nr: 27455.015 Event: 08/16/2012 Employee Is Crushed And Killed When Struck By Palletizer

At 5.30 p.m. on August 16, 2012, an employee was asked to assist with the clean-up of broken glass inside a Von Gai Palletizer machine HK Systems, Model number UVG2200-RH-5145.5 (Machine D), Serial Number 3263. The employee was instructed by a coworker to go under the raised horse of the palletizer. While the employee was inside the palletizer cleaning up the broken glass, the coworker started it and the employee was crushed and killed when the horse of the palletizer came down.

Keywords: palletizing plant, locked/tagout, crushed, broken glass

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Core Components of an Energy Control Program

1910.147 (c) General

- ◆ Energy control procedures for each type of machine
- ◆ Training and retraining to make sure employees comprehend
- ◆ Periodic inspections to ensure procedures are being followed

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(c) General

(2) Lockout/Tagout

(i) If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize a tagout system.



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(c) General

(2) Lockout/Tagout

- (ii) If a device can accept a lock, lock it out.
 - Tag out can be used IF you can prove full employee protection.
- (iii) After January 2, 1990, any new, modified, or renovated equipment must be able to accept a lock.

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(c) General

(3) Full employee protection

- (i) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

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(c) General

(3) Full employee protection

(ii) (Summarization) The tagout program must be equivalent to the level of safety obtained by using a lockout program. Additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle shall be used to reduce the likelihood of inadvertent energization.

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(c) General

(3) Full employee protection

Can tag out be used in all covered industries?

- ◆ **Part 26 – Metal Working Machinery**
- ◆ **R 408.12618. Maintenance and lubrication.**
- ◆ **Rule 2618.** (1) A power source of any metalworking machine or equipment to be repaired or services **shall be locked out** and, where required, residual pressure relieved by each employee doing such work if unexpected motion would cause injury, except where power is essential for testing and set up.

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SPECIFIC LOCKOUT REFERENCES

| | |
|----------------------------|----------------------------------|
| Part 14, Conveyors | Part 51, Logging |
| Part 17, Refuse Packers | Part 52, Sawmills |
| Part 18, Overhead Cranes | Part 57, Oil & Gas Operations |
| Part 20, Underhung Cranes | Part 62, Plastic Molding |
| Part 23, Hydraulic Presses | Part 63, Pulp, Paper, Paperboard |
| Part 26, Metalworking | Part 65, Rubber & Plastic |
| Part 42, Forging | Part 72, Automotive Service |
| Part 45, Die Casting | Part 81, Baking Operations |

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Part 26 Metalworking

Vertical standard lock out specific rule

R 408.12618. Maintenance and lubrication.
Rule 2618. (1) A power source of any metalworking machine or equipment to be repaired or services shall be locked out and, where required, residual pressure relieved by each employee doing such work if unexpected motion would cause injury, except where power is essential for testing and set up.
(2) Lubrication shall be accomplished by 1 of the following:
(a) Manually, when the machine can be shut off and locked out.
(b) Automatic pressure or gravity feed system.
(c) Extension pipe leading to an area outside of guards or away from any hazard.
(d) Or a means which would provide equal or greater protection to the employee than (a), (b) or (c).
(3) In any case, rule 732 of the general industry safety standards commission standard, Part 7. Guards for Power Transmission, being R 408.10732 of the Michigan Administrative Code, shall be followed.

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(c) General


(4) Energy control procedure.

- (i) Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

Note: Exception: The employer need not document the required procedure for a particular machine or equipment, when all of the following elements exists:

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(c) General

(4) Energy control procedure

- (1) The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which would 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 deenergize and deactivate the machine or equipment;

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(c) General
(4) Energy control procedure

- (4) The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;
- (5) A single lockout device will achieve a locked-out condition;

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(c) General
(4) Energy control procedure

- (6) The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;
- (7) The servicing or maintenance does not create hazards for other employees; and
- (8) The employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

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(c) General
(4) Energy control procedure

(ii) 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 including, but not limited to, the following:

- (A) A specific statement of the intended use of the procedure;
- (B) Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;

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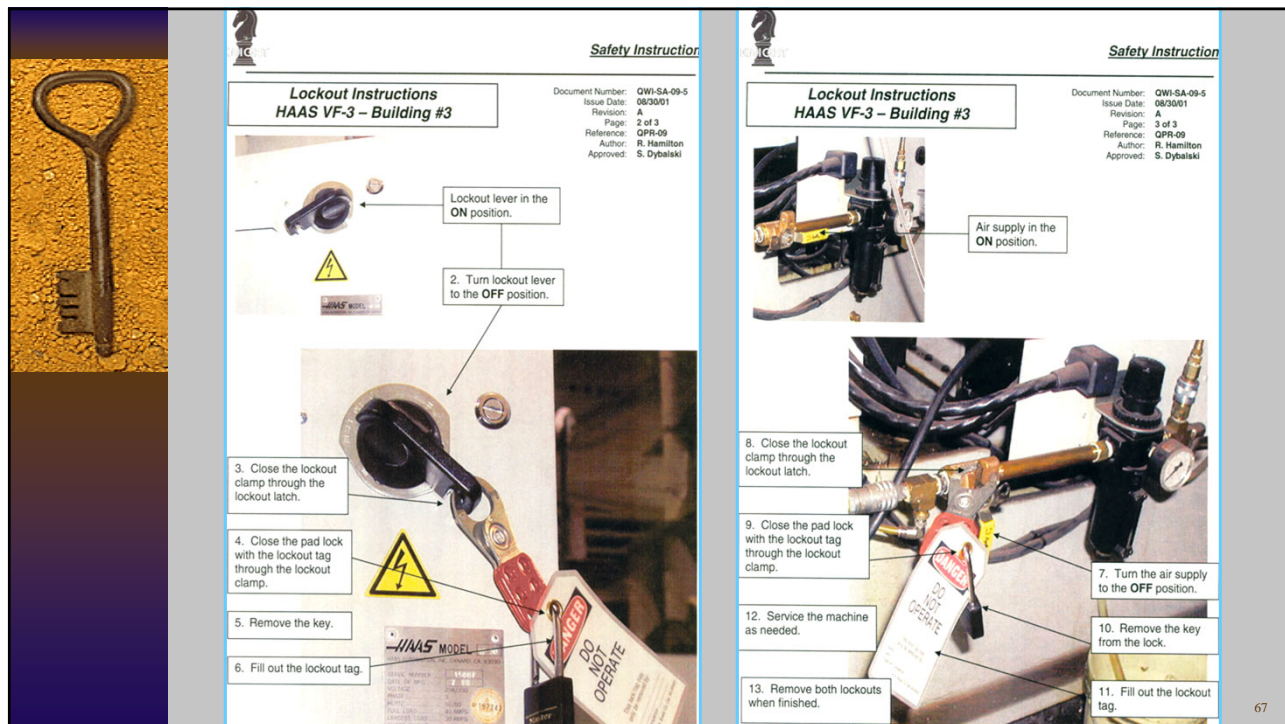
(c) General
(4) Energy control procedure

(C) Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them; and

(D) Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

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Energy Control Procedures (Work Permit System)

Having separate procedures for all possible servicing tasks may not be practical, and it may not be necessary to perform complete isolation.

After determining the tasks needing to be performed, identification of the energy sources of potential exposure and the isolation methods required to safely perform the job.

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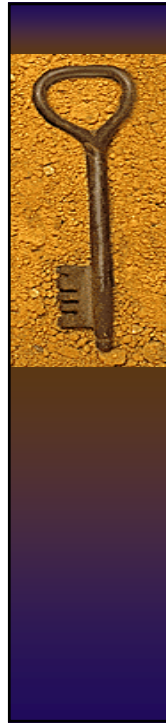
Energy Control Procedures

Example
Horizontal plastic injection molding machine



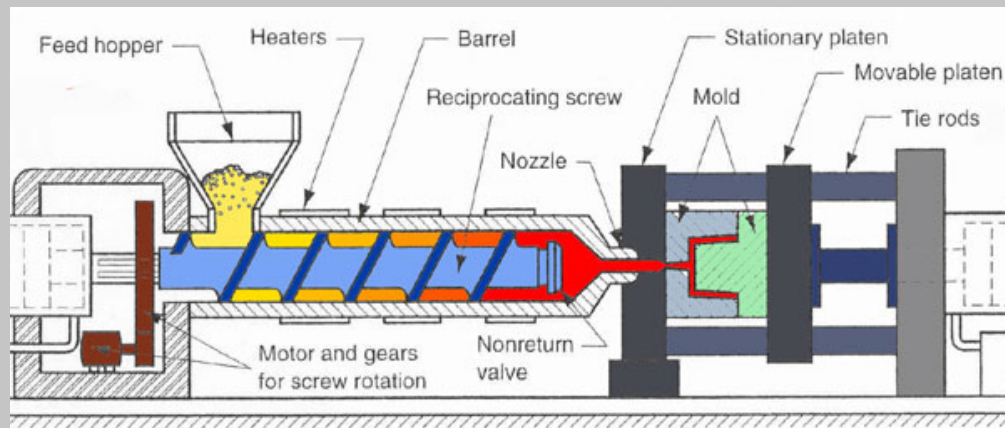
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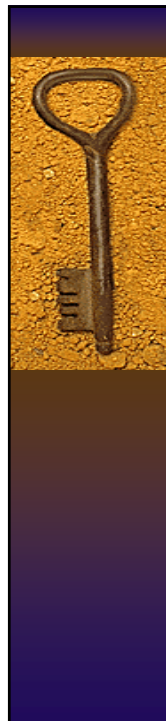
Energy Control Procedures

Example
Horizontal plastic injection molding machine



71

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(c) General
(5) Protective materials and hardware



72

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(c) General

(5) Protective materials and hardware


(i) 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.

(ii) Lockout devices and tagout devices shall be singularly identified; shall be the only device(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:



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(c) General


(5)(ii) Protective materials and hardware

(A) Durable.

(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.

(2) 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.

(3) Tags shall not deteriorate when used in corrosive environments.



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(c) General
(5)(ii) Protective materials and hardware

(B) Standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: color; shape; or size and additionally, in the case of tags at devices, print and format shall be standardized.




75



(c) General
(5)(ii) Protective materials and hardware

(C) Substantial

(1) Lockout devices. 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.



76



(c) General


(5)(ii) Protective materials and hardware

(2) Tagout devices. Tagout devices, including and their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal.



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(c) General

(5)(ii) Protective materials and hardware

(D) Identifiable. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).

(iii) Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: **DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.**

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Protective Materials and Hardware



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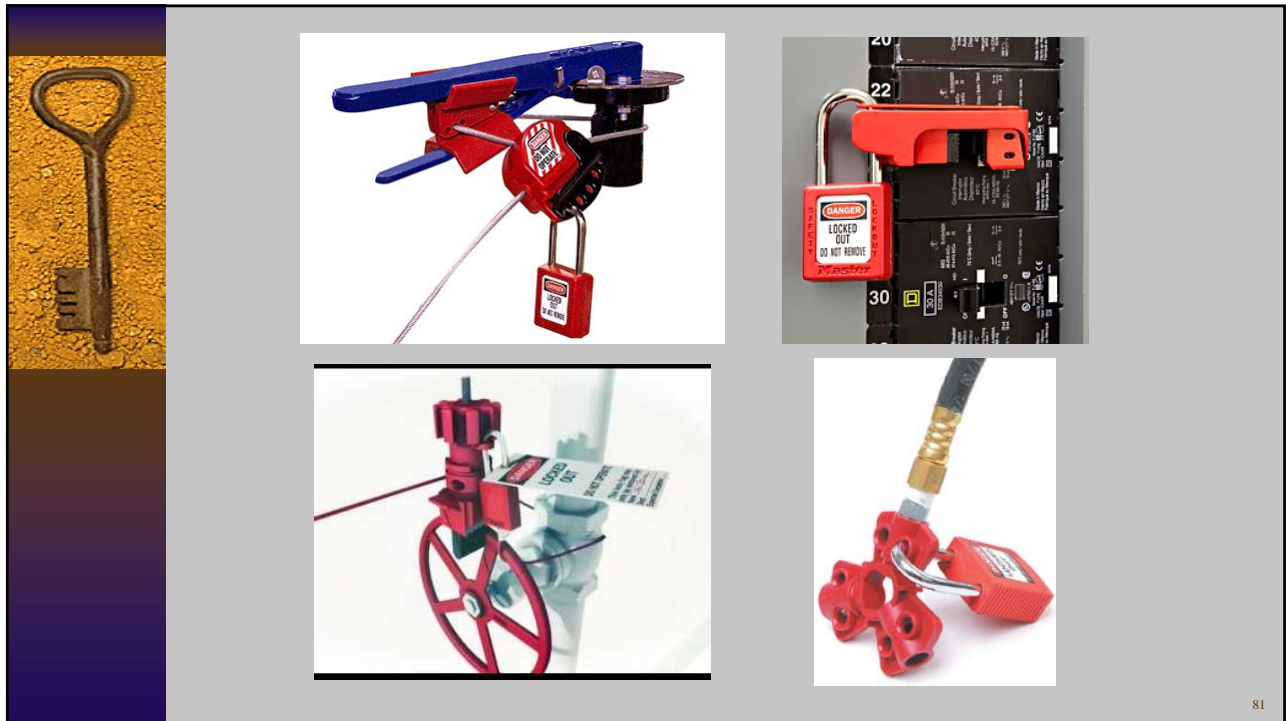
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Examples



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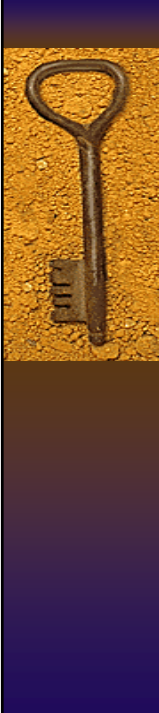
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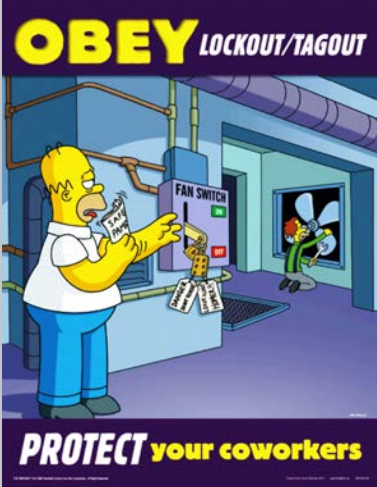
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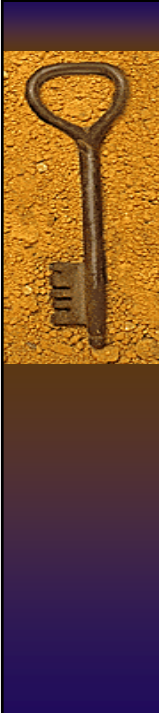


(c) General
(6) Periodic Inspection



83

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(c) General
(6) Periodic Inspection


(i) The employer shall conduct a periodic inspection of the energy control procedure at **least annually** to ensure that the procedure and the requirements of this standard are being followed.

(A) The periodic inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.

(B) The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

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(c) General


(6)(i) Periodic Inspection

(C) Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

(D) Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (c)(7)(ii) of this section.

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(c) General

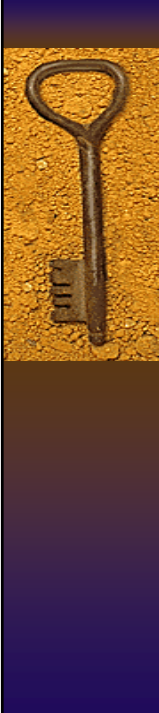
(6) Periodic Inspection

(ii) The employer shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.



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(c)(6) Periodic Inspection

How can this be accomplished?

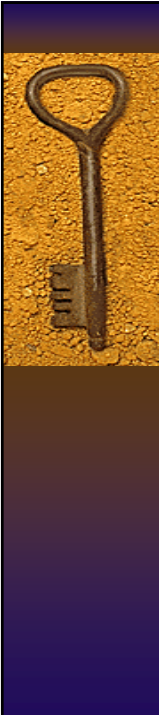
- ◆ The firm's inspector does not have to observe every authorized employee. Rather, the inspector performing the inspection may observe and talk with a representative number of such employees. In addition, reviews must still be performed with all the authorized employees.

OSHA Interpretation

- ◆ CPL 02-00-147 February 11, 2008
- ◆ 136-page directive
- ◆ XVII. Periodic Inspection
- ◆ The 4-page explanation is included in the student manual.

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OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

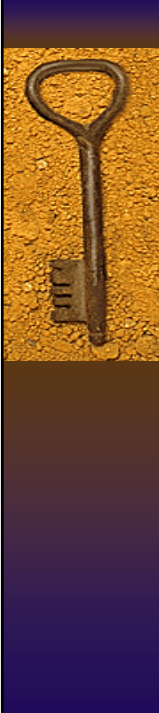
**DIRECTIVE NUMBER: CPL 02-00-147 EFFECTIVE
DATE: 2/11/08**

**SUBJECT: The Control of Hazardous Energy –
Enforcement Policy and Inspection
Procedures**

[https://www.osha.gov/sites/default/files/enforcement/directives/
CPL_02-00-147.pdf](https://www.osha.gov/sites/default/files/enforcement/directives/CPL_02-00-147.pdf)

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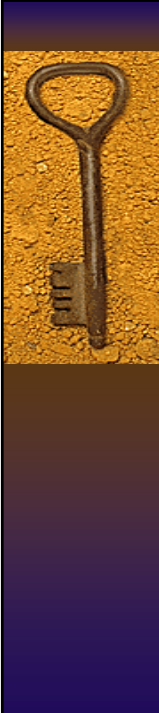
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(c) General
(7) Training and communication

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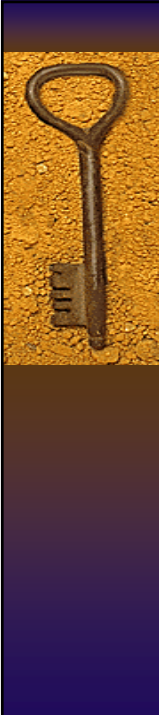
(c) General
(7) Training and communication

(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 the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

(A) 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.

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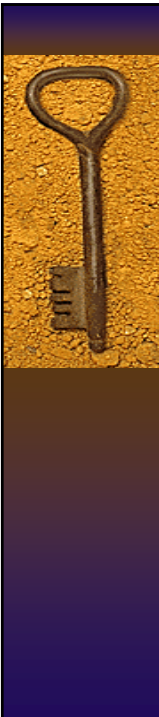
(c) General
(7)(i) Training and communication

(B) Each affected employee shall be instructed in the purpose and use of the energy control procedure.

(C) All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

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(c) General
(7) Training and communication


(ii) When tagout systems are used, employees shall also be trained in the following limitations of tags:

(A) Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

(B) When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

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(c) General
(7)(ii) Training and Communication


(C) Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

(D) Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.



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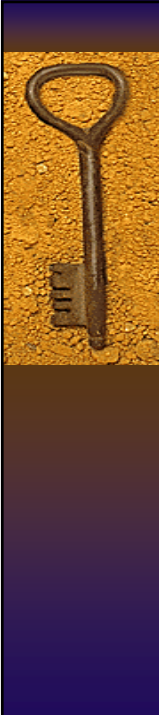
(c) General
(7)(ii) Training and communication

(E) Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

(F) Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

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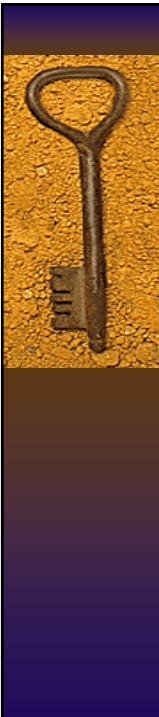


(c) General (7)(ii) Training and communication

What do we do when we have to test or position a machine or equipment during a servicing or maintenance?

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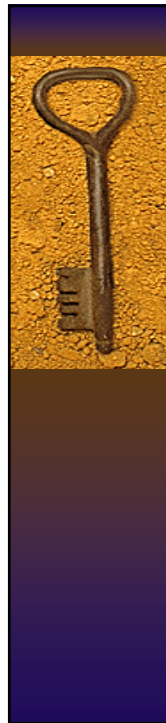
(c) General (7) Training and communication

(iii) Employee retraining.

(A) Retraining shall be provided for all authorized and affected employees 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.

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(c) General

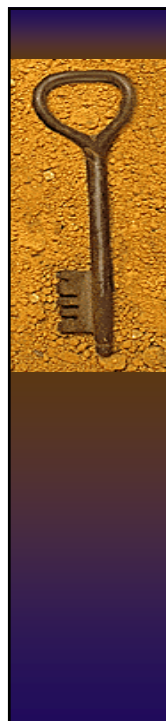
(7)(iii) Training and communication

(B) Additional retraining shall also be conducted whenever a periodic inspection under paragraph (c)(6) of this section reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

(C) The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

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(c) General


(7) Training and communication

(iv) The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.



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(c) General
(8) Energy isolation

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

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(c) General
(9) Notification of employees

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

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1910.147

(d) Application of control

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(d) Application of control

Application of control.

The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

(1) Preparation for shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.


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(d) Application of control


(2) Machine or equipment shutdown.

The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.



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(d) Application of control


(3) Machine or equipment isolation.

All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).



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(d) Application of control

(4) Lockout or tagout device application.

- (i) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.
- (ii) Lockout devices, where used, shall be affixed in a manner that will hold the energy isolating devices in a “safe” or “off” position.
- (iii) Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the “safe” or “off” position is prohibited.

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(d) (4) (iii) Application of control

- (A) Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.
- (B) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

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(d) Application of control


(5) Stored energy.

- (i) Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.



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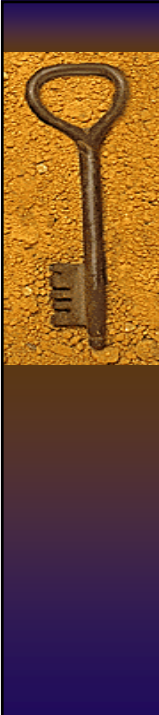
(d) Application of control

(5) Stored energy.

- (ii) If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

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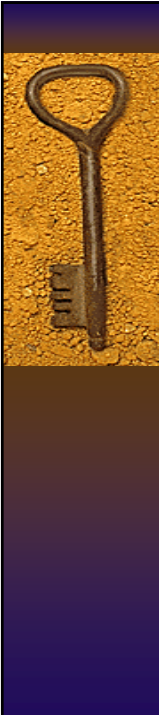
(d) Application of control

(6) Verification of isolation.

Prior to starting work on a machine or equipment that has been locked out or tagged out, the authorized employee shall verify that isolation and de-energization of the machine or equipment have been accomplished.

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Lockout / Tagout Failures

Pause (k)

110

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1910.147

(e) Release from lockout or tagout

111




(e) Release from lockout or tagout

Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed, and actions taken by the authorized employee(s) to ensure the following:

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(e) Release from lockout or tagout

- (1) The machine or equipment.** The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
- (2) Employees.**
 - (i) The work areas shall be checked to ensure that all employees have been safely positioned or removed.
 - (ii) After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.


113

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(e) Release from lockout or tagout

- (3) Lockout or tagout devices removal.** Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device.



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(e) Release from lockout or tagout

What if the employee that installed the lock is unavailable?


Procedures and training need to be developed for these situation.

The One Lock – One Person-One Key is a best practice.

- * Even during a MIOSHA inspection, enforcement officers are not able to remove locks.

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(e) (3) Release from lockout or tagout Exemptions

Procedure must include:

- (i) Verification by the employer that the authorized employee who applied the device is not at the facility;
- (ii) Making all reasonable efforts to contact the authorized employee to inform him/her that his/ her lockout or tagout device has been removed; and
- (iii) Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.


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1910.147
(f) Additional requirements

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(f) Additional requirements

(1) **Testing or positioning of machines, equipment or components thereof.** In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energizing to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

(i) Clear the machine or equipment of tools and materials in accordance with paragraph (e)(1) of this section;

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(f)(1) Additional requirements

- (ii) Remove employees from the machine or equipment area in accordance with paragraph (e)(2) of this section;
- (iii) Remove the lockout or tagout devices as specified in paragraph (e)(3) of this section;
- (iv) Energize and proceed with testing or positioning;
- (v) Deenergize all systems and reapply energy control measures in accordance with paragraph of this section to continue the servicing and/or maintenance.

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(f) Additional requirements


(2) Outside personnel (contractors, etc.).

Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures.

- (ii) The on-site employer shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

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(f) Additional requirements

(3) Group lockout or tagout.

- (i) When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.
- (ii) Group lockout or tagout devices shall be used in accordance with the procedures required by paragraph (c)(4) of this section including, but not necessarily limited to, the following specific requirements:


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(f)(3)(ii) Additional requirements

- (A) Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);



- (B) Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment and

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(f)(3)(ii) Additional requirements

- (C) When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and
- (D) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when they begin work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

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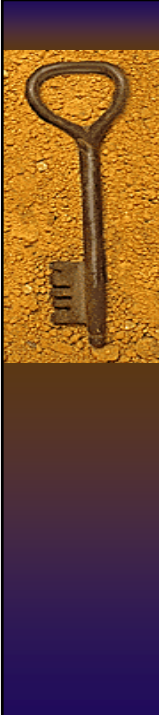
(f) Additional requirements

(4) Shift or personnel changes.

Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection.

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Case Studies

- ◆ Case Study Handout

125

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Part 85

Case Studies

126

Case Study One – Printing Press

A printing press produces printed materials as its normal production function. The printing press's rollers have to be cleaned periodically during the work shift to ensure quality control. In this scenario, the press is not shut down for the cleaning operation. The printing press is energized, and its rollers continue to spin at a very high speed. In order for employees to clean the rollers they must bypass the printing press's machine guards and use rags to clean the rollers. This exposes them to serious, ingoing nip point hazards created by the rollers. Severe laceration or amputated fingers could result if the rag or an employee's hand were to get caught in the rollers or in an area between the rollers and a fixed part of the machine.

Although the employer has a lockout/tagout program for servicing and/or maintenance of the printing presses, for this particular cleaning operation the employer believes that lockout/tagout procedures do not need to be implemented. According to the employer, this cleaning operation is exempt from lockout/tagout requirements because it falls under the minor servicing exemption and therefore the employer allows the equipment to remain operating during the cleaning operation.

Remember, as stated above, the employees are still exposed to the hazardous energy of the printing press' during the cleaning operation

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Case Study One

Printing Press

Question 1

Is this printing press roll cleaning activity covered by the Lockout/Tagout standard?

Yes

Question 2

The employer argues that the roll cleaning activity is routine, repetitive, and integral to the production operation and that lockout is not required because the minor servicing exception described in [29 CFR 1910.147\(a\)\(2\)\(ii\)](#) is applicable. Is the employer correct?

No

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Case Study- Automotive Robot

- At an employer's automotive component manufacturing facility, manufacturing operations make extensive use of robots located within fenced cages. At one location, suspension parts are transferred by rotating tables from station to station while greasing and other operations are performed on the parts by robots. If necessary, employees can gain access to the robots by entering the cages through electrically interlocked gates. When the gates are opened, the multiple energy sources that power the robots, rotating tables, and related machinery are turned off but are not deenergized or locked out. An employee who is inside a cage when a robot is activated could be struck by the robot arm or other machine parts and seriously injured.
- An injury occurred when an employee, consistent with the employer's practices, entered the robot cage without deenergizing or locking out any equipment. The employee was attempting to unjam a robot arm. In freeing the arm, the employee tripped an electric eye, causing the robot arm to cycle. The employee's arm was struck by the robot and injected with grease. The employer contends that lockout procedures were not necessary because once the gate is opened, movement of the robot arm is impossible, and a maintenance worker inside the cage would have ample warning – by the closing of the interlocked gate – before the machinery started up, to avoid injury. According to the employer, once the interlocked gate is opened, it must first be closed and a number of buttons must be pushed before any machine movement can occur. The startup procedure would take some time and the person inside the robot area would be aware of the closing of the gate and the presence of another worker at the nearby control panel.

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Case Study Two

Automotive Robot

Question 3

Does the unjamming operation take place during normal production operations?

No

Question 4

Would the minor servicing exception apply to this situation?

No

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Case Study Two

Automotive Robot

Question 5

Was the activity performed by the employee covered by the Lockout/Tagout standard?

Yes

Question 6

In this situation, would the interlocked gate alone satisfy the employer's Lockout/Tagout obligations?

No

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Case Study Two

Automotive Robot

Question 7

The employer contends that deenergizing and locking out a robot wipes out the robot's memory and requires time-consuming reprogramming. Based on this alone, could the employer claim that shutting down the robot was impractical and thus, claim that the unjamming task was exempted?

No

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Case Study Three – Nitrogen Pressure Vessels

A group of employees are assigned to replace the head seals on twelve large nitrogen pressure vessels (accumulator bottles) at a manufacturing facility. Each pressure vessel has an operating pressure of about 5,000 psig. Replacement of the seals on each vessel requires that its head be opened, releasing any vessel contents to the atmosphere. The vessels lack individual gauges to indicate internal pressure levels.

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Case Study Three

Nitrogen Pressure Vessels

Question 8

Did the pressure within the nitrogen vessels constitute hazardous energy?

Yes

Question 9

Were the employees performing a servicing and/or maintenance operation that was subject to unexpected energization, start up, or release of hazardous energy?

Yes

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Case Study Three

Nitrogen Pressure Vessels

Question 10

Does the Lockout/Tagout standard apply to this particular servicing and/or maintenance operation?

Yes

Question 11

Would the group lockout or tagout provisions apply to this operation?

Yes

135

Case Study Three

Nitrogen Pressure Vessels

Question 12

Is the employer required to use a work authorization permit?

No

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Case Study Four– Steel mill Teeming Car Repairs

An employee is assigned to adjust part of the drive mechanism on a teeming car in a steel mill. The teeming car is isolated from its energy sources and locked out, and the employee crawls underneath the car to start the maintenance job.

The employee, however, fails to shut down or deenergize a separate motor-driven unit used to position the teeming cars. While the employee is performing the maintenance, the motor-driven unit is activated for production purposes and rolls by on adjacent tracks, causing injury to the employee.

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Case Study Four

Steel Mill Teeming Car Repairs

Question 13

Is the employer required to shut down and lock out related machinery operating in the area of the covered service and maintenance, if that machinery could cause injury?

Yes

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Case Study Five – Multiple Energy Control Procedures

A manufacturing facility has 130 separate lockout procedures. Many of these procedures are unique and apply to specific pieces of equipment. Some of these procedures, however, are duplicate and address pieces of equipment that are essentially identical to another piece of equipment. The facility has 40 employees authorized to implement the 130 procedures in performing service and maintenance covered by the Lockout/Tagout standard.

The employer has implemented the following procedure for conducting periodic inspections: for the specific energy control procedures, each of the authorized employees is observed by another authorized employee performing a complete lockout of at least one piece of equipment or machinery utilizing each one of the separate energy control procedures. The employer documents each of these inspections. However, there are more specific procedures than there are authorized employees, so consequently some of the specific procedures are not observed being implemented. Instead, these procedures are inspected by holding meetings with small groups of authorized employees responsible for service and maintenance on machines or equipment covered by the procedures being reviewed. At these meetings, the relevant procedures are reviewed by the group to ensure that they are understood and effective, but actual lockout implementation is not required during the inspection.

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Case Study Five

Multiple Energy Control Procedures


Question 14

Does this scenario meet the standard's requirement that the employer conduct a periodic inspection for all energy control procedures?

Yes

These case studies came from the OSHA website at <https://www.osha.gov/etools/lockout-tagout/case-studies>

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Common Questions

- ♦ **Question:** Is the use of tags required when using locks during lockout?
- ♦ **Answer:** Part 85. Control of Hazardous Energy Sources reads, “locks shall be...Identifiable. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).” If the tag is being used to identify who the lock belongs to them it is required. If there is some other means to identify who the lock belongs to, such as color coding, numerical sequence, name I.D. on the lock, then a tag would not be required.

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Common Questions

- ♦ **Question:** MIOSHA standards dictate that all locks used for lockout in a facility will be the same. If we use the square Master locks and want to use both the long and short shaft models, does that meet the standard, or do the shafts all have to be the same length?
- ♦ **Answer:** Part 85 reads, “locks shall be...standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: color, shape; or size and additionally, in the case of tagout devices, print and format shall be standardized.” Since the requirement is that the lock be standardized in only one criterion, the shank size could be different as long as another identifying feature is the same, such as color.

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Common Questions

- ◆ **Question:** Is there a lock out exemption for horizontal injection molding machines?
- ◆ **Answer:** As of January 1st, 2017, the exemption during a die change is no longer allowed. Employers are now required to fully comply with Part 85, Control of Hazardous Energy Sources (LO/TO) if there is the potential for harmful exposure to hazardous energy sources during maintenance and servicing activities on horizontal injection molding machines.


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Common Violations


- ◆ 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 the safe application, usage, and removal of the energy controls are acquired by employees.



Cited 48 times in 2023
Total penalties \$81,100
\$1,690 average citation

144

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Common Violations

- ◆ Employer did not establish a program consisting of energy control procedures, employee training and periodic inspections

Cited 25 times in 2023
Total penalties \$53,900
\$2,156 average citation

145

145



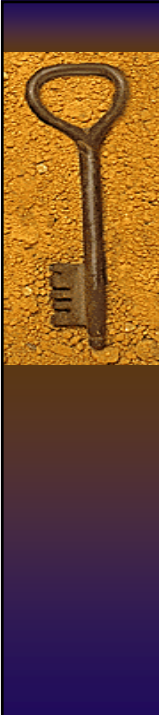
Common Violations

- ◆ The employer did not conduct an annual or more frequent inspection of the energy control procedure to ensure that the procedure and requirements of Part 85 were followed.

Cited 66 times in 2023
Total penalties \$75,900
\$1,150 average citation

146

146



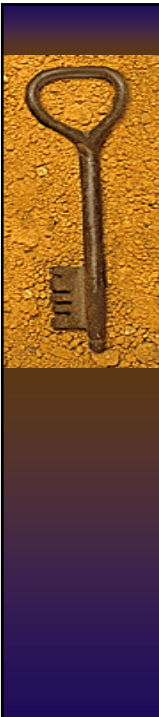
Common Violations

- ◆ Authorized employee(s) did not 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.

Cited 56 times in 2023
Total Penalties \$37,200
\$665 average citation

147

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Common Violations

- ◆ Procedures were not developed, documented and utilized for the control of potentially hazardous energy when employees were engaged in activities covered by Part 85.

Cited 130 times in 2023
Total Penalties \$596,100
\$4,585 average citation

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Common Violations

- ♦ 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 including, but not limited to, the following...

Cited 16 times in 2023
Total penalties \$17,600
\$1,100 average citation

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Additional/Specific Requirements for Lockout from Part 40.

When there is a possibility for exposure to the hazards of electrical contact.

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MIOSHA Requirements

- ◆ MIOSHA does not require that you need to be a licensed electrician to work on electrical equipment in General Industry. MIOSHA does require that individuals working on electrical equipment comply with work practices in this section.
 - 1910.332 = Training Requirements
 - 1910.333 = Selection and use of Work Practice
 - 1910.333(b)(2) = Lockout and Tagging
 - 1910.333(c) = Working on Energized Parts
 - 1910.335 = PPE & Unattended work

151

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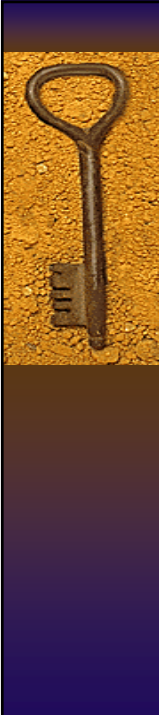
Rule 1910.332(b)(3) Training Requirements

Qualified persons, that is, those who are permitted to work on or near exposed energized parts, shall, at a minimum, be trained in, and familiar with, all of the following:

- (a) The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.

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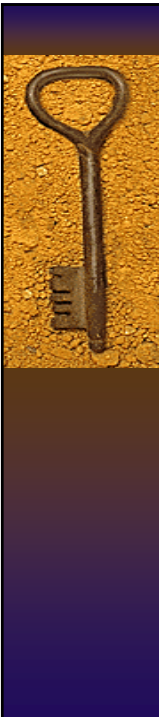


Rule 1910.332(b)(3) Training Requirements cont.

- (b) The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- (c) The clearance distances specified in Rule 4005 and the corresponding voltages to which the person will be exposed.

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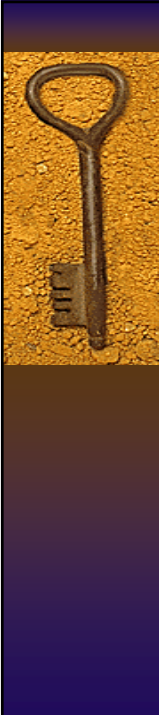


Rule 1910.333(a) Selection and use of work practices

- (1) Safety related work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts, when work is performed near or on equipment or circuits which are or may be energized. The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.

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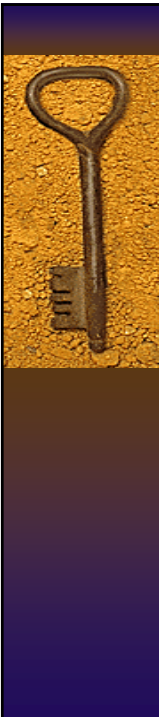
Rule 1910.333(a)(1) Selection and use of work practices

(2) Live parts to which an employee may be exposed shall be de-energized before the employee works on or near them, unless the employer can demonstrate one of the following:

- ◆ Increased hazard
 - Interruption of life-support, deactivation of emergency alarms systems, shutdown of hazardous location ventilation equipment, or the removal of illumination for an area

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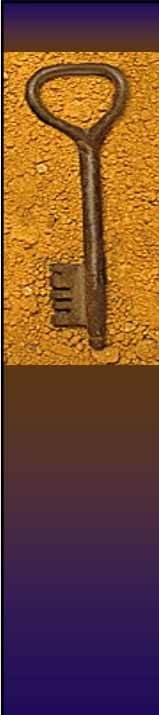
Rule 1910.333(a)(1) Selection and use of work practices

De-energization exceptions (continued)

- ◆ Infeasibility due to design or operational limitations
 - Testing of electrical circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous industrial process

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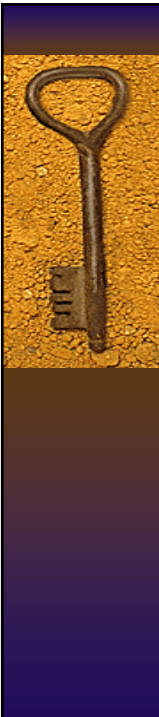
Rule 1910.333(a)(2) Selection and use of work practices

(3) If the exposed live parts are not de-energized other safety-related work practices shall be used to protect employees.

- ◆ Protect an employee from any contact between energized circuit parts and any part of his or her body
- ◆ Work practices that are used shall be suitable for the conditions
- ◆ Specific work practice requirements are detailed in Rule 1910.333(c)

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Rule 1910.333(b)(2) Working on or near exposed deenergized parts

While any employee is exposed to contact with parts of fixed electrical equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out in accordance with the requirements of this rule.

Note: Lockout and tagging procedures that comply with current lockout requirements will also be deemed to comply with the requirements of this rule.

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Arc Flash


- NFPA 70E consensus standard
- While MIOSHA does not specifically reference arc flash labeling or training, MIOSHA Part 40-Safety Related Work Practices contains the requirements when dealing with exposed electrical equipment.

MIOSHA Part 33-Personal Protective Equipment discusses the requirements for protecting employees from exposed electrical hazards.

MIOSHA offers MTI courses for both PPE and Part 39&40 for extensive information when dealing with live electric.

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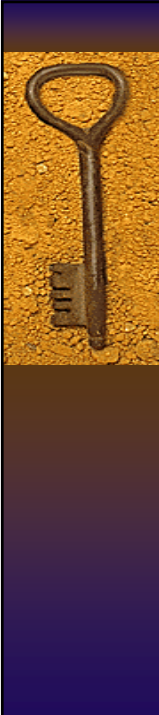
Summary

Part 85 - Key Elements

1. Assess machinery/equipment
2. Develop procedures/provide equipment
3. Communicate/train relative to those procedures
4. Inspect (verify) procedures
5. Re-communicate/train
6. Enforce

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Assessment

- ◆ The purpose of this assessment is to validate the knowledge learned in class.
- ◆ Passing score of 70% correct is required.
- ◆ Class reference materials, computers, and notes are not allowed to be used during the assessment.
- ◆ Collaboration/discussion with others is not allowed during the assessment.
- ◆ Answers will be reviewed after everyone completes and submits their assessment.

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Thank you.

Don't Forget to Take the Survey



MIOSHA
Michigan Occupational Safety
and Health Administration

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Part 85. Control of Hazardous Energy Sources

Student Resources

MIOSHA Standards:

[Part 85. Control of Hazardous Energy Sources](#)

[Part 40. Safety-Related Work Practices](#)

MIOSHA Fact Sheet:

[Machine Specific Lockout \(GISHD #009\)](#)

MIOSHA Publications:

[Defective Equipment Tags \(CET-0202\)](#)

[Lock It Out! Save A Life \(CET-0305\)](#)

[Lockout/Tagout Compliance Guide \(SP-27\)](#)

MIOSHA Instruction:

[Lockout/Tagout, Minor Tool Changes and Adjustments, and Other Minor Servicing Activities \(GISHD-COM-07-3\)](#)

Other Resource:

[The Control of Hazardous Energy – Enforcement Policy and Inspection Procedures \(OSHA Instruction\)](#)

MIOSHA Training Institute (MTI) Resources:

www.michigan.gov/mti

MIOSHA Training Calendar:

www.michigan.gov/mioshatraining

MIOSHA Homepage:

www.michigan.gov/miosha



Michigan Department of Labor and Economic Opportunity
Michigan Occupational Safety and Health Administration
Consultation Education and Training Division
525 W. Allegan St., P.O. Box 30643
Lansing, Michigan 48909-8143

For further information or to request consultation, education and training services
call 517-284-7720

or

visit our website at www.michigan.gov/miosha

www.michigan.gov/leo

LEO is an equal opportunity employer/program.