



KUMC Control of Hazardous Energy (Lockout / Tagout) Program October 2000

Policy

No faculty, staff or student of the University of Kansas Medical Center identified as a required participant of the Lockout / Tagout program shall engage in any task which presents risk of exposure to uncontrolled energy without first having received the appropriate instruction outlined in this program.

Introduction

This procedure establishes the University of Kansas Medical Center requirements for the Lockout/Tagout of all energy sources whenever maintenance or service is done on machines or equipment. It should be used to ensure that machinery or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the *unexpected* energization or start-up could cause injury.

This procedure applies only to machinery and equipment at UMKC owned or operated facilities. Employees should consult their supervisor or the safety office concerning activities by outside contractors.

Components

The Control of Hazardous Energy, or Lockout/Tagout, program is designed to protect employees from the unexpected release of energy during maintenance operations. Each supervisor is ultimately responsible for the following specific actions required by this Standard. There are three components to the Lockout/Tagout program:

1. Energy Control Procedures. All equipment requiring repair or maintenance should be evaluated to identify all potential energy sources. Energy control procedures should be developed to effectively isolate these energy sources during repair and maintenance activities.
2. Training. All employees shall be instructed in the safety significance of the energy control procedures. "Authorized" employees should receive training in the recognition of energy sources and the application of energy control procedures.
3. Periodic Inspections. A "responsible person" should, at least once per year, assure that the energy control procedures are being used properly and are effective in control all potential energy sources.

The department shall maintain written records showing employee participation I initial training and periodic inspections. On an annual basis the department shall submit copies of these documents the Medical Center Safety Office.

All employees and students shall comply with federal, state, local, and institutional regulations and guidelines during lockout/tagout procedures. Each employee is responsible for his/her own safety and health, the safety and health of other workers in the surrounding area and the protection of the environment.

1. Purpose

The purpose of the Lockout/Tagout program is to ensure that all employees are protected from the hazards of unexpected release of energy during repair or maintenance activities. Machine guarding procedures provide protection during normal operation of equipment but during repair or maintenance activities, machine guards may be removed and employees may reach into the danger zone of the equipment. Energy control procedures are designed to protected employees during these situations.

2. Definitions

Authorized Employee

An *authorized employee* is an employee who uses a lockout or tagout procedure on equipment during servicing or maintenance of that equipment. Only trained and authorized employees may perform lockout/tagout procedures.

Affected Employee

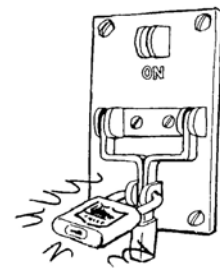
An *affected employee* is an employee whose job requires him/her to operate a machine on which servicing or maintenance is being performed under lockout/tagout or who works in an area exposed to the potential hazards connected to a lockout/tagout activity.

Energy Isolation Device

A mechanical device such as a switch, circuit breaker, line valve, blocking device, etc. that physically prevents the release or transmission of electrical, mechanical, hydraulic, thermal, chemical or any other type of energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

Lockout Device

A device that utilizes a positive means, such as a padlock or padlock combined with a chain, stop block, or adapter



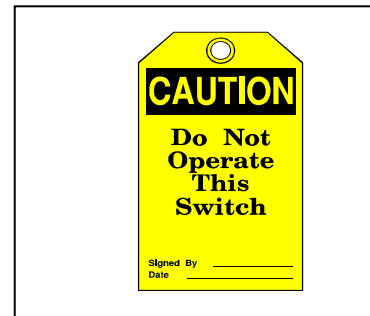
pin to hold an energy isolation device in the safe position and prevent the energizing of a machine or equipment.

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 startup of the equipment or release of hazardous energy.

Tagout Device

A prominent warning device, such as a tag secured by a nylon cable tie, that forbids the operation of energy isolating switches, circuit breakers, valves, blocks, etc. The warning tag must identify the authorized person who attached the tag and the reason(s) for doing so.



Zero Energy State.

The energy state where all potentially hazardous stored or residual energy has been released, bled off, or bypassed so that the machine or equipment will not move or release energy. "Zero energy state" should be assured during servicing or maintenance activities. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of "zero energy" should continue until the work is completed.

3. Energy Control Procedures

The general lockout/tagout procedures outlined herein should be applied in all situations where the unexpected energization or start-up of machines or equipment during service or maintenance could cause injury to employees.

All machines or equipment needing repair or maintenance should be evaluated to identify all potential energy sources and to determine if all energy sources are effectively isolated by the lockout/tagout procedure. This evaluation will result in placing the equipment in one of three categories below:

1. Cord and plug. Equipment powered by an electrical cord and plug may be serviced by any maintenance employee as long as the employee unplugs the equipment and maintains control of the plug during the maintenance activity. "Control of the plug" should mean in possession (such as in the hand or pocket), or in arm's reach and line of sight, or having a lockout/tagout device (plug boot) on the plug.
2. Single energy source. A list of equipment that may require lockout/tagout of a single energy source can be found in **Appendix A**. A lockout device should be applied to the energy isolation device by the authorized person doing the maintenance activity.

3. Multiple energy sources. Specific written procedures for equipment with multiple energy sources can be found in **Appendix B**. The lockout/tagout procedures should be performed only by the authorized person doing the maintenance activity.

Lockout should be the primary means to ensure that equipment under repair is isolated from its energy source(s). Padlocks used for lockout procedures should be of the key type and be individually keyed. A tag bearing the identity of the authorized employee who attached the device should accompany each padlock used for Lockout/Tagout procedures. There should be only two keys for each "lockout" padlock. One key should be in the possession of the authorized employee. The second key should be secured and controlled by the "responsible person". The second key should only be used in case of emergency. The "responsible person" should be responsible for assuring that Form 1, parts A and B, and *Record of Removal of Lockout/Tagout Devices*, has been completed before the second key is released for use.

Tagout alone does not provide the degree of protection that is provided by lockout procedures. It should only be used in instances where placement of the lockout device is physically impossible. If tagout procedures alone must be used during servicing and maintenance operations, it should be the responsibility of the authorized employee who tags out the equipment to notify the affected employees and the work area supervisor. It should be the work area supervisor's responsibility to ensure that the tagout device is not ignored, bypassed or otherwise defeated.

Whenever major repair, renovation, or modification of machines or equipment is performed, the energy isolation devices for such machines or equipment, if not already so configured, should be modified to accept a lockout device.

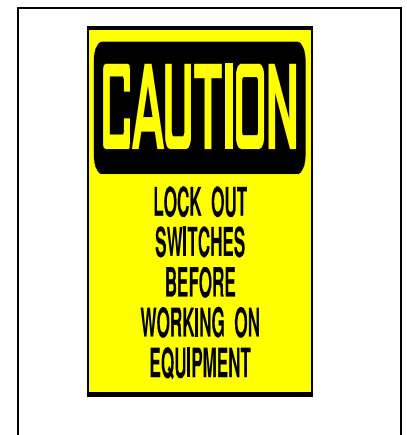
When equipment is purchased, the "responsible person" should ensure that the machinery or equipment has energy isolation devices that are designed to accept a lockout device(s). As well, detailed lockout/tagout instructions should be included in the servicing and maintenance manual provided with the equipment.

The immediate supervisor of the authorized employee(s) performing the maintenance of the equipment is responsible for enforcement of these procedures.

4. General Lockout/Tagout Procedure -

Application of Control Measures

- Prior to implementation of a lockout/tagout procedure, all affected personnel should be notified that equipment is to be repaired utilizing lockout/tagout procedures.
- The authorized employee shall identify the type and magnitude of all energy sources. Energy sources may include electrical, hydraulic, pneumatic, kinetic (gravity), pressure, and stored energy.
- The machinery or equipment should be shut down or turned off using normal operating procedures by the machine operator or other qualified personnel. This may be done using normal operating controls, on/off switch, etc.



- Energy isolation devices shall be identified for each energy source.
- Lockout/tagout devices should be applied to each energy isolation device identified by the procedure for the equipment to be repaired. Lockout devices should be attached so as to hold the energy isolation device in an "off" or safe position. Tagout devices should be attached so that they are immediately obvious to anyone attempting to operate the energy isolation device.
- After all necessary lockout/tagout devices have been attached, the authorized employee should attempt to operate the machinery or equipment using the normal operating controls or on/off switch to determine if desired energy isolation has been achieved. Controls should be returned to their "off" position after completion of the test.
- Potentially hazardous stored or residual energy should be released, bled off, or bypassed so that the machine or equipment is maintained in a "zero energy state" during servicing or maintenance activities. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of "zero energy" should continue until the work is completed.
- Service or maintenance should be performed using applicable safety procedures and personal protective equipment.

Release from Lockout/Tagout

- Before energy is restored to equipment that has been under service or maintenance, the authorized employee should perform a visual inspection of the work area. The purpose of the inspection is to ensure that all components of the equipment are operationally intact, that all operating controls or switches are in the "off" position, and that employees are safely positioned or removed from the area.
- All affected personnel should be informed that servicing or maintenance activities are complete and that lockout devices are going to be removed.
- The Lockout/tagout devices should be removed by the employee who applied the device. Normally, only the employ who applied the lockout/tagout device shall remove it. When this is not possible, the steps outlined in Form 1, Parts "A" and "B" must be completed and recorded.
- After the lockout/tagout devices are removed, the equipment operator or authorized person should operate the machine to assure servicing or maintenance was successful and that equipment is again in proper operating condition.

5. Non-Routine Procedures

- *Testing or Positioning of Equipment* - In situations where lockout/tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, the following sequence of actions should be followed:
 - (1) Clear the machine or equipment of tools and materials,
 - (2) Inform affected employees,
 - (3) Remove the lockout or tagout devices,
 - (4) Energize and proceed with testing or positioning,
 - (5) When testing or positioning is completed, de-energize all systems and reapply energy control measures.
- *Group lockout or tagout* - When servicing and/or maintenance is performed by a crew, craft, department or other group, they should utilize the following procedure:

- (1) A supervisor should be responsible for a group of authorized employees working under the protection of a group lockout or tagout device.
 - (2) The designated supervisor should determine the exposure status of the group members with regard to the lockout or tagout of the machine or equipment.
 - (3) Each authorized employee should affix his/her personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work. He/She should remove those devices when he or she stops working on the machine or equipment being serviced or maintained.
- *Shift or Personnel Changes* - The following procedures should be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection.
 - (1) All affected personnel on the new shift should be notified that equipment is being repaired utilizing lockout/tagout procedures.
 - (2) The authorized employee who is replacing the present authorized employee should affix his/her lock before the present authorized employee removes his/her lock.
 - *Outside Contractors* - 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 should inform each other of their respective lockout or tagout procedures. The on-site employer should ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

6. Training

All employees should be instructed in the safety significance of the lockout/tagout procedure.

Training should be performed before the employee is permitted to use or be affected by any lockout/ tagout procedure.

All "*affected*" employees should be instructed in the purpose and use of the energy control procedures and in recognition and purpose of lockout/tagout devices.

Each "*authorized*" employee should receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy, and the methods and means necessary for energy isolation and control.

Additional training should be given when:

- (1) Lockout/tagout procedures are modified
- (2) When equipment or machinery is added or modified
- (3) When periodic inspections show a deficiency in understanding of the procedures
- (4) When "responsible person" determines that additional training is necessary to assure continued effectiveness of the program.

7. Periodic Inspections

A “Responsible Person” should assure that an evaluation of energy control procedures is conducted at least once a year to ensure compliance with these policies.

Inspections should be performed by an authorized employee other than the one utilizing the energy control procedure being inspected.

Where lockout is being used for energy control, the inspection should include a review, between the inspector and the authorized employee, of the employee's responsibilities under the energy control procedure being inspected.

When tagout only is used for energy control, the inspection should include a review between the inspector and each supervisor, and the authorized and affected employee who may have some effect on the energy control procedures. The inspector should determine if employees understand the purpose of the tagout device, the limitations of a tagout device, and the prohibition against defeating the purpose of a tagout device.

Both types of inspections should be recorded by completing Form 2.

The completed forms should be reviewed by “responsible person” to determine the effectiveness of the energy control program and to correct any deviations or inadequacies observed in the inspections. Corrective actions should be documented and attached to the completed inspection forms.

The completed forms should be maintained by “responsible person” and retained for a minimum of five years.

8. Summary

In summary, the Lockout/Tagout program has five requirements:

1. The Medical Center is required to implement and maintain a written lockout/tagout program. This program is to be made readily accessible to all employees and students exposed to lockout/tagout procedures.
2. All Medical Center machines and equipment must be evaluated to determine the potential energy sources and the methods to isolate the energy sources during maintenance and repair procedures.
3. An initial and periodic training must be provided for all employees and students who may be exposed to lockout/tagout procedures. The initial or general portion of the training will be provided by the Medical Center Safety Office. The initial area-specific training shall be conducted and documented by the employee's/student's department. Annual review of area specific information shall be conducted and documented by the designated department Safety Representative.
4. The human resources department shall maintain training records for each employees safety orientation training. Departments/schools maintain their own training records for all annual refresher training.

5. Periodic Inspections shall be conducted at least once per year by a “responsible person” that is familiar with the equipment. The Periodic Inspection should assure that an evaluation of energy control procedures is in compliance with these policies.

9. Availability of Written Lockout/Tagout Program

A copy of this written program shall be available for review in the Safety Office, B320 KU Hospital Bldg., from 8:00 a.m. to 5:00 p.m., Monday through Friday. Each department or section shall also maintain a copy that will be made accessible to all area personnel covered by the program.



RECORD OF REMOVAL OF LOCKOUT/TAGOUT DEVICES

It is the policy of KUMC that the person who attaches a lockout/tagout device must be the person to remove it.

Exceptions to this policy require the completion of this form, Parts "A" and "B", by the supervisor of the employee who placed the device.

ALL QUESTIONS MUST BE ANSWERED!

Part "A"

- 1) Why must the device be removed by someone other than the one who attached it?

- 2) Have you verified that the employee who attached the device is not at the facility? (Must answer "Yes" to continue) Yes No

- 3) Have you made a reasonable attempt to contact the employee to receive the permission or to inform them that their lockout/tagout device will be removed? (Must answer "Yes" to continue) Yes No

- 4) Contact "responsible person" and request the duplicate key for the subject lock. If the duplicate key is not available, the device may be removed by force (bolt cutters, etc.), but only as a last resort.

- 5) *As soon as the employee's lock has been removed, immediately install your personal lockout lock and standardized tags, OR verify that the employee to work on the machine, equipment or system has LO/TO equipment present and is familiar with the requirements for this procedure.*

Part "B"

- 1) Ensure that the original employee whose Lockout/Tagout equipment was removed has knowledge that their Lockout/Tagout device(s) was removed prior to resuming work at the facility.

- 2) Return all Lockout/Tagout equipment to the original employee.

NOTE: Shift or personnel changes must maintain effective lockout/tagout protection. Employees should not remove personal LO/TO devices in anticipation of attachment of other employee's LO/TO devices.

PERIODIC LOCKOUT/TAGOUT INSPECTION

LOCATION _____ DATE _____

1. Identification of the machine to which an inspection is being done.

2. Authorized and Affected Employees interviewed.

Name(print)

Signature

SSN

3. Primary and Stored Energy Sources and Magnitude:

4. Deficiencies noted:

Upon completion of this form, it should be forwarded to the safety manager for filing.
Completed forms should be maintained for a minimum of 5 years.

Kansas University Medical Center LOCKOUT / TAGOUT PROCEDURE

Lockout Procedure for _____

Procedure Number _____ Date of Last Revision _____

Purpose

This procedure establishes the minimum requirements for the lockout of energy isolation devices whenever maintenance or servicing is done on the equipment listed above. It should be used to ensure that all potentially hazardous energy sources are locked out before employees perform any servicing or maintenance.

Compliance With This Program

All employees are required to comply with the restrictions and limitations imposed upon them during the use of this lockout procedure. Only authorized employees are allowed to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance should not attempt to start, energize or use that machine or equipment. Failure to comply will result in disciplinary action in accordance with company policy, up to and including, termination for a single incident.

Sequence of Lockout

Establishing energy isolation

1. Verbally notify all affected employees and their supervisor(s) that servicing or maintenance is required in their area and that a machine or equipment must be shut down and locked out to perform the servicing or maintenance.

2. The authorized employee should identify the type and magnitude of the energy source(s) and should understand the hazards of the energy and the methods available to control the energy. The authorized employee should assure that all sources of energy have been identified.

Type	Magnitude
_____	_____
_____	_____
_____	_____
_____	_____

Procedure Number _____ Date of Last Revision _____

3. If the machine is operating, the operator or authorized employee should shut it down using the normal stopping procedures.
 - A. _____
 - B. _____
 - C. _____
 - D. _____

4. De-activate the energy isolation device(s) so that all sources of energy are isolated.
 - A. _____
 - B. _____
 - C. _____
 - D. _____

5. Lock out the energy isolation device(s). Energy isolation devices needed.
 - A. _____
 - B. _____
 - C. _____

6. Dissipate or restrain stored or residual energy.
 - A. _____
 - B. _____

7. Ensure that the equipment is disconnected from the energy sources by **first** checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operation controls or by testing to make certain the equipment will not operate.

CAUTION: Return operating controls to neutral or "off" position after verifying the isolation of the equipment.

Restoring Equipment to Service - When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps should be taken.

1. Check the machine or equipment and the immediate area to ensure that tools and equipment used during maintenance have been removed and the machine components are operationally intact and ready to start.
2. Check the work area to ensure that all employees are safely positioned or removed from the area.
3. Verify that the operating controls are in "neutral" or "off" position.
4. Remove the lockout devices and re-energize the machine.
5. Notify affected employees that the servicing or maintenance is completed and that the machine or equipment is ready to use.

Standard Number 1910.147

Title The Control of Hazardous Energy (Lockout/Tagout).

(a) Scope, application and purpose -

(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.
- (ii) This standard does not cover the following:
 - (A) Construction, agriculture and maritime employment;
 - (B) Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering; and
 - (C) Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by Subpart S of this part; and
 - (D) Oil and gas well drilling and servicing.

(2) Application.

- (i) This standard applies to the control of energy during servicing and/or maintenance of machines and equipment.
- (ii) Normal production operations are not covered by this standard (See Subpart O of this Part). Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if:
 - (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.
Note: Exception to paragraph (a)(2)(ii): Minor tool changes and
- (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.
 - (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.

- (3) Purpose.
- (i) This section requires 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 should be used and supplemented by the procedural and training requirements of this section.

(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.

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.

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.

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

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.

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

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.

Lockout. The placement of a lockout device on an 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.

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 the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

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

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 startup of the equipment or release of hazardous energy.

Tagout. The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating operation.

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

Tagout. The placement of a tagout device on 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.

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.

(c) General -

- (1) Energy control program. The employer should establish a program consisting of energy control procedures, employee training and to periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment should be isolated from the energy source and rendered inoperative.
- (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 should utilize a tagout system.
 - (ii) If an energy isolating device is capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section should utilize lockout, unless the employer can demonstrate that the utilization of a tagout

system will provide full employee protection as set forth in paragraph (c)(3) of this section.

- (iii) After January 2, 1990, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment should be designed to accept a lockout device.
- (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 should be attached at the same location that the lockout device would have been attached, and the employer should demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.
 - (ii) In demonstrating that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout
- (4) Energy control procedure.
- (i) Procedures should 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 exist:

- 1) The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees:
 - 2) the machine or equipment has a single energy source which can be readily identified and isolated:
 - 3) the isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment:
 - 4) the machine or equipment is isolated from that energy source and locked out during servicing or maintenance:
 - 5) a single lockout device will achieve a locker-out condition:
 - 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 re-energized of the machine or equipment during servicing or maintenance.
- (ii) The procedures should 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;
 - (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.
- (5) Protective materials and hardware.
 - (i) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware should be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.
 - (ii) Lockout devices and tagout devices should be singularly identified; should be the only device(s) used for controlling energy; should not be used for other purposes; and should meet the following requirements:
 - (A) Durable.
 - {1} Lockout and tagout devices should be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
 - {2} Tagout devices should 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 should not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.
 - (B) Standardized. Lockout and tagout devices should 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 should be standardized.
 - (C) Substantial -
 - {1} Lockout devices. Lockout devices should 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.
 - {2} Tagout devices. Tagout devices, including their means of attachment, should be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means should be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.
 - (D) Identifiable. Lockout devices and tagout devices should indicate the identify of the employee applying the device(s).
 - (iii) Tagout devices should warn against hazardous conditions if the machine or equipment is energized and should include a legend such as the following: Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate.
- (6) Periodic inspection.
 - (i) The employer should 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 should be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.
 - (B) The periodic inspection should be conducted to correct any deviations or inadequacies identified.
 - (C) Where lockout is used for energy control, the periodic inspection should 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 should 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.
- (ii) The employer should certify that the periodic inspections have been performed. The certification should 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.
- (7) Training and communication.
- (i) The employer should 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 should include the following:
 - (A) Each authorized employee should 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.
 - (B) Each affected employee should 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, should 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.
 - (ii) When tagout systems are used, employees should 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.
 - (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.

- (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.
- (iii) Employee retraining.
 - (A) Retraining should 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.
 - (B) Additional retraining should 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 should reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.
- (iv) The employer should certify that employee training has been accomplished and is being kept up to date. The certification should contain each employee's name and dates of training.
- (8) Energy isolation. Lockout or tagout should be performed only by the authorized employees who are performing the servicing or maintenance.
- (9) Notification of employees. Affected employees should be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification should be given before the controls are applied, and after they are removed from the machine or equipment.
- (d) Application of control.** The established procedures for the application of energy control (the lockout or tagout procedures) should cover the following elements and actions and should 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 should 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.
 - (2) Machine or equipment shutdown. The machine or equipment should 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.
 - (3) Machine or equipment isolation. All energy isolating devices that are needed to control the energy to the machine or equipment should be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
 - (4) Lockout or tagout device application.
 - (i) Lockout or tagout devices should be affixed to each energy isolating device by authorized employees.
 - (ii) Lockout devices, where used, should be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.

- (iii) Tagout devices, where used, should 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.
 - (A) Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment should 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 should 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.
 - (5) Stored energy.
 - (i) Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy should be relieved, disconnected, restrained, and otherwise rendered safe.
 - (ii) If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation should be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.
 - (6) Verification of isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee should verify that isolation and de-energization of the machine or equipment have been accomplished.
- (e) Release from lockout or tagout.** Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures should be followed and actions taken by the authorized employee(s) to ensure the following:
 - (1) The machine or equipment. The work area should 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 area should be checked to ensure that all employees have been safely positioned or removed.
 - (ii) Before lockout or tagout devices are removed and before machines or equipment are energized, affected employees should be notified that the lockout or tagout devices have been removed.
 - (iii) After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees should be notified that the lockout or tagout device(s) have been removed.
 - (3) Lockout or tagout devices removal. Each lockout or tagout device should be removed from each energy isolating device by the employee who applied the device. Exception to paragraph (e)(3). When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program. The employer should demonstrate that the specific procedure should include at least the following elements:
 - (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.

(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 energized to test or position the machine, equipment or component thereof, the following sequence of actions should be followed:
 - (i) Clear the machine or equipment of tools and materials in accordance with paragraph (e)(1) of this section;
 - (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) De-energize all systems and reapply energy control measures in accordance with paragraph (d) of this section to continue the servicing and/or maintenance.
- (2) Outside personnel (contractors, etc.).
 - (i) 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 should inform each other of their respective lockout or tagout procedures.
 - (ii) The on-site employer should ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.
- (3) Group lockout or tagout.
 - (i) When servicing and/or maintenance is performed by a crew, craft, department or other group, they should 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 should 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:
 - (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
 - (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 should affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and should remove those devices when he or

she stops working on the machine or equipment being serviced or maintained.

- (4) Shift or personnel changes. Specific procedures should be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, 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.

(The information collection requirements contained in this section are approved by the Office of Management and Budget (OMB) and listed under OMB control number 1218-0150.)

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