

Control of Hazardous Energy (Lockout/Tagout Requirements and Procedures): OSHA Standard 1910.147¹

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The Impact of Safety on Florida Agriculture

Florida agriculture, including forestry and seafood, made an annual economic impact of \$53 billion in 1998. More than 81,000 people work on the 40,000 farms in the state, and more than 50,000 are employed in other activities related to agriculture. The state's agricultural enterprises range from large citrus, vegetable and cattle operations to small family-operated farms.

Over the past 10 years, there have been approximately 240 deaths related to agriculture in Florida, according to data compiled by the Deep South Center for Agricultural Health and Safety. In addition, agriculture has one of the highest injury and death rates among U.S. industries.

Safety in Florida agriculture is challenging because:

- the state's agricultural enterprises are diverse,
- safety knowledge among workers varies,
- manual labor is used extensively,
- the climate creates year-round heat stress.
- Therefore, it is vital to assist the public in learning about OSHA documents related to agriculture. More related information is available at the Florida AgSafe Web site and at the OSHA regulations Web site .

Overview

This document, a condensation of Standard 1910.147 of the Occupational Safety and Health Act, is not intended to be totally inclusive but rather to highlight the information and requirements in the complete OSHA standard that owners and managers of agricultural businesses should understand.

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Standard 1910.147 covers the servicing and maintenance of machines and equipment which with unexpected energization or start up, or the release of stored energy, could cause injury to employees. It establishes minimum performance requirements for the control of such hazardous energy.

The standard does not apply, at present, to agricultural production. [However, it does apply to agricultural processing, including packing houses and other agri-businesses. The concepts should nevertheless be applied to all workplaces.]

Application

This standard applies to the control of energy during servicing and/or maintenance of machines and equipment. Normal production operations are not covered. Servicing and/or maintenance which takes place during normal production operations is covered only if:

- An employee is required to remove or bypass a guard or other safety device; or
- An employee is required to place any part of his or her body in contact with the point of operation of a machine or piece of equipment, or into an associated danger zone during its operating cycle.

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, provided that the work is performed using alternative measures which provide effective protection.

This standard does not apply to the following:

- Work on extension cord and plug connected electric equipment. (Workers should control such equipment by unplugging it from the energy source. The plug must be under the exclusive control of the employee performing the servicing or maintenance.)
- 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 the employer demonstrates that:

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

Purpose

In order to prevent injury to employees, this standard 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.

Definitions

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.

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.

General Requirements

The employer must establish a program consisting of *energy control procedures, employee training and 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 will be isolated from the energy source and rendered inoperative.

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

If an energy isolating device is capable of being locked out, the employer's energy control program must utilize lockout, unless the employer can demonstrate that a tagout system will provide full employee protection. (See the section "Full Employee Protection.") All newly purchased equipment must be lockable.

Lockout or tagout may be performed only by the authorized employees performing the servicing or maintenance.

Full Employee Protection

When a tagout device is used on an energy isolating device which is capable of being locked out, it must be attached at the same location that the lockout device would have been attached, and the employer must demonstrate that the tagout program will provide protection at least as effective as locks.

In demonstrating that the tagout program is equally safe as a lockout program, the employer must demonstrate full compliance with all tagout-related provisions of this standard, together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. (These may include such safety measures as removing an isolating circuit element, blocking a controlling switch, opening an extra disconnecting device or removing a valve handle to reduce the likelihood of inadvertent energization.) Always use a lockout device when possible!

Energy Control Procedure

Procedures must be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this standard.

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

- the machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees,

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

Energy control procedures must 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 specific statement of the intended use of the procedure,
- specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy,
- specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them, and
- specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices and other energy control measures.

Protective Materials and Hardware

Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners or other hardware must be provided by the employer for isolating, securing or blocking machines or equipment from energy sources.

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

- They must be *durable* .
 - Lockout and tagout devices must be capable of withstanding the environment to which they are exposed for the maximum expected period of exposure.
 - Tagout devices must be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or render its message illegible. Tags must not deteriorate when used in corrosive environments, such as areas where acid and alkali chemicals are handled and stored.
- They must be *standardized* .
 - Lockout and tagout devices must be standardized according to either color, shape or size. Additionally, in the case of tagout devices, print and format must be standardized.
- They must be *substantial* .
 - *Lockout devices* must be substantial enough to prevent removal without the use of excessive force or unusual techniques (such as with bolt cutters or other metal cutting tools).
 - *Tagout devices* , including their means of attachment, must be substantial enough to prevent inadvertent or accidental removal. Means of attachment must be non-reusable, attachable by hand, self-locking and

non-releasable, with a minimum unlocking strength of no less than 50 pounds.

- They must be identifiable.
 - *Locks* and *tags* must indicate the identity of the employee who applies them. In addition, tags must warn against hazardous conditions if the machine or equipment is energized and must include a legend such as the following:
 - Do Not Start.
 - Do Not Open.
 - Do Not Close.
 - Do Not Energize.
 - Do Not Operate.

Periodic Inspection

The employer must conduct a periodic inspection of the energy control procedure at least annually to ensure that it and the requirements of this standard are being followed. The periodic inspection must be conducted to correct any identified deviations or inadequacies, and performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.

Where *lockout* is used for energy control, the periodic inspection must include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure. Where *tagout* is used for energy control, the periodic inspection must in addition review the elements described in the section "Additional Tagout Training."

The employer must certify that the periodic inspections have been performed. The certification must 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.

Training and Communication

The employer must provide training to ensure that the purpose and function of the energy control program are understood by employees, and that they acquire the knowledge and skills required for the safe application, use and removal of the energy controls. The training must include the following:

- Each *authorized employee* must 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.
- Each *affected employee* must be instructed in the purpose and use of the energy control procedure.
- *All other employees* must be instructed about the procedure, and about the prohibition on restarting or reenergizing machines or equipment which are locked out or tagged out, if their work operations are or may be in an area where energy control procedures may be utilized.
- *All new employees* must be trained.

Additional Tagout Training

When tagout systems are used, employees must also be trained in the following limitations of tags:

- Tags are essentially warning devices affixed to energy isolating devices; they do not provide the physical restraint provided by a lock.
- When a tag is attached, it is not to be removed without authorization of the authorized person responsible; it is never to be bypassed, ignored or otherwise defeated.
- In order to be effective, tags must be legible and understandable by all employees.
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

- Tags may evoke a false sense of security. They are only one part of an overall energy control program.
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

Employee Retraining

Retraining must 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 energy control procedures.

Additional retraining must also be conducted whenever a periodic inspection (see the section Periodic Inspection) 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. The retraining must reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

The employer must certify that employee training has been accomplished and is being kept up to date; certification must contain each employee's name and dates of training. [All authorized or affected employees should be retrained at least annually.]

Notification of Employees

The employer or authorized employee must notify affected employees of the application and removal of lockout devices or tagout devices. Notification must be given before the controls are applied and after they are removed from the machine or equipment.

Lockout or Tagout Procedures

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

- 1. Prepare for shutdown.
- 2. Shut down the machine or equipment.
- 3. Apply the lockout or tagout device.
- 4. Render safe all stored or residual energy.
- 5. Verify the isolation or deenergization of the machine or equipment.

Removal of Locks and Tags

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

- The work area must be inspected to ensure that nonessential items have been removed and machine or equipment components are operationally intact.
- The work area must be checked to ensure that all employees have been safely positioned or removed, and employees must be informed that the lockout or tagout devices are to soon be removed.
 - *Before* lockout or tagout devices are removed and before machines or equipment are energized, affected employees must be notified that the lockout or tagout devices have been removed.
 - *After* lockout or tagout devices have been removed and before a machine or equipment is started, affected employees must be notified that the lockout or tagout device(s) have been removed.
- Each lockout or tagout device may be removed only by the employee who applied it.
 - However, when the authorized employee who applied the lockout or tagout device is not available to remove it, it 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. [This is most likely to occur when a

maintenance or repair job was begun by one group of authorized employees on one shift and completed by authorized employees on a later shift.] Through this procedure, the employer must, at least:

- verify that the authorized employee who applied the device is not at the facility,
- make all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed, and
- ensure that the authorized employee has this knowledge before he/she resumes work at that facility.

Additional Requirements

Testing or Positioning of Machines, Equipment, Components

When lockout or tagout devices must be temporarily removed in order to test or position the machine, equipment or component, the following sequence of actions must be followed:

- 1. Clear the machine or equipment of tools and materials.
- 2. Remove employees from the machine or equipment area.
- 3. Remove the lockout or tagout devices.
- 4. Energize and proceed with testing or positioning.
- 5. Deenergize all systems and reapply energy control measures (see the section "Lockout or Tagout Procedures") to continue the servicing and/or maintenance.

Outside Personnel (Contractors, Etc.)

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

that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

Group Lockout or Tagout

When servicing and/or maintenance is performed by a crew, craft, department or other group, they must employ a procedure which protects employees equally as well as a personal lockout or tagout device.

Shift or Personnel Changes

During shift or personnel changes, specific procedures must ensure the continuity of lockout or tagout protection.