Lockout/Tagout Manual



IOWA STATE UNIVERSITY

Environmental Health and Safety

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IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY

Protecting the Safety, Health, and Environment of the Iowa State Community

Iowa State University strives to be a model for safety, health, and environmental excellence in teaching, research, extension, and the management of its facilities. In pursuit of this goal, appropriate policies and procedures have been developed and must be followed to ensure the Iowa State community operates in an environment free from recognized hazards. Faculty, staff, and students are responsible for following established policies and are encouraged to adopt practices that ensure safety, protect health, and minimize the institution's impact on the environment.

As an institution of higher learning, Iowa State University

- fosters an understanding of and a responsibility for the environment,
- encourages individuals to be knowledgeable about safety, health and environmental issues that affect their discipline, and
- shares examples of superior safety, health and environmental performance with peer institutions, the State of Iowa and the local community.

As a responsible steward of facilities and the environment, Iowa State University

- strives to provide and maintain safe working environments that minimize the risk of injury or illness to faculty, staff, students, and the public,
- continuously improves operations, with the goal of meeting or exceeding safety, health and environmental regulations, rules, policies, or consensus standards, and
- employs innovative strategies of waste minimization and pollution prevention to reduce the use of toxic substances, promote reuse, and encourage the purchase of renewable, recyclable and recycled materials.

The intent of this statement is to promote environmental stewardship, protect health, and encourage safe work practices within the Iowa State University community. The cooperative efforts of the campus community will ensure that Iowa State University continues to be a great place to live, work, and learn.

Wendy Wintersteen

President

Directory of Service and Emergency Providers

Services

Environmental Health and Safety

2408 Wanda Daley Drive | (515) 294-5359

Iowa State University Occupational Medicine Department

G11 Technical and Administrative Services Facility (TASF), 2408 Pammel Drive | (515) 294-2056

McFarland Clinic PC, Occupational Medicine

1018 Duff Avenue | (515) 239-4496

Thielen Student Health Center

2647 Union Drive | (515) 294-5801

Emergency

Emergency - Ambulance, Fire, Police

911

Department of Public Safety/ Iowa State University Police

Armory, 2519 Osborn Drive | (515) 294-4428

Mary Greeley Medical Center

1111 Duff Avenue | (515) 239-2011



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A. Introduction

lowa State University (ISU) recognizes that preventing the unexpected start-up or release of stored energy from equipment during maintenance is key to protecting employees from injury. To address this issue and to comply with the Occupational Safety and Health Administration's (OSHA) Lockout/Tagout Standard (29 CFR 1910.147), the Department of Environmental Health and Safety (EH&S) has developed the Iowa State University Lockout/Tagout Manual. This manual outlines the procedures for conducting a safe lockout and/or tagout of equipment when maintenance is necessary.

Lockout/tagout (LOTO) is accomplished by placing a lockout and/or a tagout device on a switch, valve, breaker, etc. to prevent reactivation of the equipment and to warn that maintenance activities are in progress. Equipment is considered "locked out" when the potential hazardous energy has been blocked and operation of the equipment is prevented until the lockout device is removed. Equipment is considered "tagged out" when a warning tag is placed on the equipment warning others that the equipment is being serviced and must not be operated. These safety measures should be used together to provide the maximum level of protection for those performing the service.

Before any university personnel perform service/maintenance activities, they must understand the proper procedures for energy control as outlined in this manual and in OSHA's Lockout/Tagout Standard. The procedures outlined in this manual should ensure that:

- personnel can identify machinery requiring LOTO
- effective LOTO procedures are used to isolate and control hazardous energies
- proper employee training is provided to both Authorized and Affected Employees (defined in Definitions)
- periodic reviews of LOTO procedures are performed to verify their effectiveness

Program Responsibilities

University

ISU is responsible for both ensuring the safety of its employees and compliance with all related requirements of state and federal regulations. The administration encourages employees at all levels to promote positive attitudes regarding safety, to incorporate safety into their work practices and to cooperate fully in the implementation of safety-related programs.

Departments

Each university department is responsible for evaluating areas under its administrative control, to determine whether there are processes or equipment to which the Lockout/Tagout Program would apply. Departments that find LOTO requirements applicable are responsible for the adoption and implementation of the contents of the ISU Lockout/Tagout Manual, and for providing all necessary equipment to control hazardous energies.

Managers and Supervisors

Managers and supervisors are responsible for: designation of authorized employees, ensuring that employees are properly trained, maintenance of program records, and completion of annual program reviews.

Employees

Employees are responsible for observing all practices and procedures contained in the ISU Lockout/Tagout Program, for attending designated training and for reporting hazardous or unsafe conditions to their supervisors and/or EH&S.

Environmental Health and Safety

EH&S has created the ISU Lockout/Tagout Program and will assist individual departments in the implementation of manual requirements.

Scope

The scope of this program is to prevent injury from electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other hazardous sources in machines and equipment. Potential hazardous energy sources must be identified, isolated, and locked and/or tagged out before starting a service/maintenance task. Typical tasks requiring LOTO procedures include

- a task requiring an employee to enter a machine's point of operation or any associated danger zone
- repairing electrical circuits
- cleaning, repairing, and maintaining machinery with moving parts
- · cleaning jammed mechanisms
- · removing or bypassing a guard or other safety device

To comply

All affected departments must meet the following minimum general requirements:

- develop written, equipment-specific lockout procedures for the control of potentially hazardous energies prior to service/ maintenance activities. This may be accomplished by utilizing the Energy Control Procedures form or its equivalent
- ensure that LOTO devices are available to all employees as needed
- ensure that when new equipment is purchased, or when existing equipment is modified, it has the ability to be locked out
- enforce the proper use of LOTO equipment and establish control of energy sources
- inform outside contractors of ISU procedures and how coordination of lockout/tagout will occur
- provide and/or coordinate employee LOTO training programs
- perform at least annual reviews of LOTO procedures
- maintain adequate records

Exemptions

Partial Exemption

Equipment is exempt from written, equipment-specific procedures when *all* of the elements listed below exist. (Note: Equipment covered by this partial exemption must still be locked out following established procedures listed in Section D, Lockout/Tagout Procedures.)

- equipment/machine has no potential for stored or residual energy
- equipment/machine has a single energy source that can be readily identified and isolated
- isolation and locking out of energy source completely deenergizes and deactivates equipment/machine
- equipment/machine is isolated from the energy source and locked out during the course of service/maintenance activities
- · a single lockout device will achieve a lockout condition
- lockout device is under the control of a single individual doing the service/maintenance
- service/maintenance does not create hazards for others
- ISU has had no incidents involving the unexpected activation or reenergizing of the equipment/machine before being serviced



Total Exemption

None of the requirements of the ISU Lockout/Tagout Program apply if all conditions of the exemption are met. Total exemptions include:

- Equipment that is completely de-energized by unplugging a power cord. The unplugged power cord must be under the exclusive control of the employee(s) conducting the service/maintenance activities. Plug lockouts are recommended as an added level of protection.
- Hot tap operations involving gas, steam, water or petroleum products. The employer must show that continuity of service is essential, shutdown is impractical, and proper protection of the employees has been provided for. Any alternative approach used must be fully documented by the department choosing those methods.

B. Employee Training

Training on the purpose, content and function of the Iowa State University (ISU) Lockout/Tagout Program is required for all employees who participate in or are affected by the lockout/tagout of equipment. Training can be obtained through department-specific training or completing online "Lockout/Tagout Training" through Learn@ISU. The course covers LOTO procedures along with electrical safety issues. Site Specific Training, must be documented and kept, showing training dates, times, attendance and items covered.



Authorized Employees

Authorized Employees are those who have received proper training and have been "authorized" by their department to apply LOTO devices when necessary. Training for Authorized Employees shall include:

- recognition of locations, types and magnitudes of potential hazardous energy sources in the work area
- proper LOTO procedures
- proper use of LOTO devices (and any related equipment) used by the department
- · lockout or tagout device removal
- · how to deal with special conditions



Affected Employees

Affected Employees are those employees affected by the shut down or who work in areas where equipment is being serviced/maintained. Training for Affected Employees shall include:

- purpose and use of the LOTO procedures
- how to recognize LOTO equipment
- · prohibition on tampering with LOTO equipment



Retraining is required when:

- there is a new or revised energy control procedure
- an Authorized Employee's job duties change (regarding LOTO)
- the Lockout/Tagout Program is changed
- additional LOTO hazards arise, such as new equipment, modified processes or the use of different LOTO devices
- periodic inspections show employee deficiencies in energy control techniques





C. Lockout/Tagout Devices









Lockout/tagout (LOTO) equipment consists of tags, locks, hasps, chains, and other hardware used to prevent the operation of equipment being serviced or maintained. Lockout devices must be used whenever possible, to ensure a positive means of energy control, by holding equipment in a SAFE or OFF position. Tags should be used in conjunction with lockout devices to warn against operation.

Regardless of the device used, all LOTO devices must meet the following minimum criteria:

- they must be of durable construction and capable of withstanding the conditions in which they are placed
- they must be identified as such and must only be used for the control of hazardous energy sources All other uses are prohibited
- · they must identify the individual applying the device
- they must not be bypassed, ignored or otherwise defeated
- they should be standardized within each department in color, size, shape and format
- they should be removed by the Authorized Employee originally attaching them. Removal by anyone else must be performed by following the guidelines in Section F, Removal of Lockout/ Tagout Devices

Use of Tags

Use of tags alone is allowed only when equipment cannot be physically altered to accept a lockout device. In this case, all other procedures consistent with the lockout program must be followed. The tags must be affixed as closely as possible to the isolation devices, immediately obvious to anyone attempting to restart the equipment/machine. Additional control measures must be taken to reinforce the tagout device (such as opening an extra disconnecting device, removal of a valve handle, or additional training).

Tags must be legible and understandable by all employees and must contain warnings against energizing the equipment, such as DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, or DO NOT OPERATE. Tags must be in plain view, at the same location as the energy isolation devices and must be securely attached to prevent accidental removal.

D. Lockout/Tagout Procedures

Before service/maintenance activities begin, the following procedures *must* be implemented in the order listed below, when locking or tagging out equipment.

1. Prepare for shutdown

The Authorized Employee shall evaluate the equipment to be serviced, identify all sources of hazardous energies and the methods necessary to control them. This information shall be used to complete the Energy Control Procedures form or its equivalent

2. Notify all Affected Employees

The Authorized Employee turning off the power shall notify Affected Employees in the work area that power will be shut off, the reason for the shut-down and that the equipment will be locked/tagged out.

3. Shut down equipment

The equipment/machine shall be shut down by the normal stopping procedure. When appropriate, a "DO NOT OPERATE" tag shall be affixed to the power switch.

4. Isolate equipment

The equipment/machine shall be de-energized, secured and isolated from hazardous energy sources. An orderly shutdown must be utilized to avoid any increased or additional hazard(s) to employees.

5. Lockout/tagout

The Authorized Employee shall place locks and/or tags in the appropriate energy isolating locations.

6. Release stored energy

After lockout devices have been placed on the equipment, all stored electrical, gravitational, mechanical and/or thermal energy must be disconnected and drained to a zero-energy state or otherwise made safe by the blocking or repositioning of equipment. This can be accomplished by:

- releasing pressured lines such as hydraulic, air, steam, gas and water
- releasing spring-loaded equipment
- blocking mechanical equipment having moving, rotating or elevated parts

7. Verify isolation

Before performing maintenance on the machine, the Authorized Employee verifies the system is isolated. This is generally accomplished by first establishing that no personnel are exposed and then turning the machine switch to the ON position using the normal operating controls. Verification of isolation must be continued if there is a chance of the re-accumulation of stored energy during the service/maintenance activity.

8. Perform the service/maintenance activity

LOTO devices should be removed promptly following completion of service/maintenance activities. See Section F, Removal of LOTO Devices.

E. Special Conditions

In order to provide continuity of lockout/tagout (LOTO) protection, the following steps are required for the situations identified below.

Group Lockout/Tagout

A group LOTO is necessary when service/maintenance is performed by more than one individual. A procedure must be developed that outlines how group LOTO will occur. This information should be identified on the Energy Control Procedures form or its equivalent. Group LOTO can be accomplished through the use of a lockout device that accepts multiple locks or a group lock box (stores all keys to locks used and can only be opened by one individual). One person from the group should be selected to oversee the LOTO procedure. The group representative will be responsible for:

- affixing the group lockout device or maintaining control of the lock box
- ensuring that lockout/tagout procedures are followed, including verifying that equipment is de-energized
- continually monitoring the work to ensure that employees on the crew are not exposed to lockout/tagout hazards
- verifying that all procedures for returning the equipment back into service are completed **before** lockout/tagout devices are removed

Shift Changes

When equipment/machine maintenance extends beyond one work shift, a procedure must be in place to transfer control of the equipment/machine to the arriving shift. This transfer is the responsibility of all departing and arriving shift supervisors involved with the maintenance project. Responsibilities include:

- overseeing the transfer of control of the existing LOTO device(s) or the attachment of a separate device(s)
- ensuring that the continuity of the energy control procedure is maintained until the oncoming shift supervisor arrives and takes control of the job
- documenting the method used (original device or separate device) on the Energy Control Procedures form or its equivalent

Exchange of Information with Contractors

When some or all maintenance work is to be performed by contractors, information exchange must occur to ensure that all parties know how LOTO of equipment/machines will take place. The department must:

- ensure that there is an appropriate exchange of information regarding LOTO procedures to be used by both the department and the contractor
- use the Exchange of Information or equivalent method to document the exchange with the contractor
- inform Authorized Employees of any differences (such as restrictions and prohibitions) between the two procedures
- attach the Exchange of Information to the procedures used to complete the work
- file all completed forms with the department's Lockout/Tagout Program

Testing or Positioning of Equipment/Machines

When an employee must move part of a machine to test or position it for service/maintenance, and reenergization is required, the temporary removal of LOTO devices and subsequent reenergization must follow this sequence:

- 1. Clear equipment/machine of tools and other miscellaneous materials.
- 2. Remove all employees from the equipment/machine area.
- Remove LOTO devices.
- 4. Energize and proceed with testing or positioning.
- 5. De-energize and reapply LOTO devices.

F. Removal of Lockout/Tagout Devices

Once the specific maintenance or service work has been completed, the person who attached the lock or tag is responsible for promptly removing that device. Removal of lockout/tagout (LOTO) devices will be accomplished by following the steps listed below:

1. Inspect the work area.

Ensure that the equipment/machine is fully assembled and operational, all tools and nonessential items are removed, and all safety guards are reinstalled.

- 2. Ensure that all employees are clear of the equipment/machine.
- 3. Remove the LOTO device.

Each device must be removed by the person who put it on unless the conditions listed below in "Removal of Another Person's Device" are met.

- 4. Re-energize the equipment/machine.
- 5. Notify Affected Employees that servicing has been completed and the machine is ready for use.
- 6. Complete the Energy Control Procedures form.

File the document with the department's Lockout/Tagout Program.

Removal of Another Person's Device

Before removing a lock or tag that has been affixed by another employee, the supervisor must:

- verify that the employee who attached the device is not available to remove the device
- make all reasonable efforts to notify the employee that their device will be removed
- ensure the Authorized Employee knows that the LOTO device has been removed. This must be done *before* the employee resumes work

Definitions

Affected Employee

An employee whose job requires operation or use of equipment/machines on which service/maintenance activities are performed under lockout/tagout, or whose job requires work in an area where such service/maintenance activities are being performed.

Authorized Employee

An employee who locks out or tags out equipment/machines in order to perform service/maintenance activities. An Affected Employee becomes an Authorized Employee when that employee's duties include performing service/maintenance activities covered under the lowa State University Lockout/Tagout Program.

Energized

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

Energy Isolating Device (Mechanism)

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.

Lockout

The placement of a lockout device on an energy isolating mechanism in accordance with established procedures. The lockout device will ensure that 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 mechanism in a safe position and prevent the energizing of equipment/machines. Included are blank flanges and bolted slip blinds.

Service/Maintenance

Includes workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, or servicing/maintaining equipment/machines. These activities include lubrication, cleaning and unjamming of equipment/machines, and making adjustments or tool changes in areas where employees may be exposed to the unexpected energization or startup of the equipment or to the release of hazardous energy.

Tagout

The placement of a tagout device on an energy isolating mechanism in accordance with established procedures. The tag should state that the energy isolating mechanism and the equipment being controlled may not be operated until the tagout device is removed.

Non-discrimination Statement

"Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3350 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515 294-7612, email eooffice@iastate.edu"