

Rowan University Academic & Research Operations Lockout/Tagout Procedure

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Section 1: Purpose

The Rowan University Academic & Research Operations Lockout/Tagout Procedure is intended to be a comprehensive safety procedure. This procedure covers the Lockout/Tagout (LOTO) requirements for machinery, equipment, and all other hazardous energy sources located within academic spaces, including but not limited to the sciences, arts, and engineering departments. All Academic & Research personnel who service, maintain, adjust, clean, or un-jam components of machinery or equipment must follow specific written LOTO Procedures for the particular task, equipment, machine, device, or energy source.

Section 2: Procedure

2.1 Applicability

This procedure applies to all Rowan University Academic and Research machinery and equipment. This procedure does not apply to Rowan University Facilities LOTO requirements. Please refer to the Facilities Operations EHS Shop Manual for Facilities-specific LOTO policies. You may also obtain additional information by contacting the EHS Department at EHS@Rowan.edu or 856.256.5105.

This LOTO Procedure does not apply to machinery or equipment meeting the following conditions:

Work performed on plug-connected equipment where:

- a. Exposure to the hazardous energy or start-up of the equipment is controlled by unplugging the equipment from the energy source, **and**;
- b. The plug is under the exclusive control of the individual performing the service or maintenance.

2.2 Responsibilities:

Academic Departments are responsible for:

- Ensuring that all machinery and equipment owned within their department requiring LOTO have documented and up-to-date procedures.

Principal Investigators, Technicians, and Staff are responsible for the following:

- Create written LOTO Procedures and ensure that they are maintained and up-to-date. All LOTO Procedures must be readily available to Affected, Authorized, and Environmental Health and Safety personnel.
- Ensuring that Affected and Authorized individuals receive LOTO training as specified in this procedure.
- Ensuring that Affected and Authorized individuals are following all written LOTO Procedures at all times and that there is no deviation from written procedures during actual work.
- Purchasing and maintaining LOTO equipment in compliance with OSHA regulations and as described in this procedure.
- Conducting periodic LOTO Procedure inspections as required by OSHA and this procedure.

Affected Individuals are responsible for:

- Read and comprehend all written LOTO Procedures for the machinery and equipment they operate within their work area.
- Reporting unsafe LOTO conditions to PI's, Technicians, and Environmental Health and Safety.
- Respect of all LOTO devices attached to machinery or equipment and always follow all written LOTO Procedures.

Authorized Individuals are responsible for:

- Reading, comprehending, and following all written LOTO Procedures for the machinery and equipment they are authorized to perform LOTO on.
- Ensuring that Affected Individuals are made aware of all implementations of LOTO work before it occurs.
- Ensuring that Affected Individuals are made aware of when work is completed and when LOTO has been removed.
- Reporting unsafe LOTO conditions to PI's, Technicians, and Environmental Health and Safety.

Environmental Health and Safety is responsible for:

- Providing PI's, Technicians, and Staff with assistance to ensure that appropriate LOTO Procedures are written.
- Periodic auditing of written LOTO Procedures.
- Auditing the application of actual LOTO on machinery or equipment to ensure procedure compliance and personnel safety.

2.3 LOTO Definitions

The following list of definitions have been adopted from [29 CFR 1910.147 The control of hazardous energy \(lockout/tagout\)](#). Changes to some wording have been made in order to adapt these definitions so that they apply to both students and Rowan University employees in academic and research laboratories. The overall intent of these definitions remains unchanged from Federal OSHA Regulations pertaining to Lockout/Tagout.

Affected Individual. A Student, PI, Faculty, or Staff member whose job or responsibility 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 or responsibility requires them to work in an area in which such servicing or maintenance is being performed.

Authorized Individual. A person who locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment. An affected individual becomes an authorized individual when that person's duties include performing servicing or maintenance covered under this procedure.

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 if 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 electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy source.

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

NOTE: Hot Tap work is not permissible in academic or research operations.

Lockout. The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensures 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 essential or combination type, holds an energy isolating device in a safe position and prevents the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds. See [Appendix G](#) of this procedure for the approved color of lockout devices.

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

Servicing and/or maintenance. 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 individual 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 regular production operation.

Tagout. The placement of a tagout device on an energy isolating device, per an established procedure, indicates 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 following 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. See [Appendix G](#) of this procedure for the approved style and tag formatting.

2.4 LOTO Training Requirements

Initial Training

The supervising department shall provide training to ensure that all affected individuals understand the purpose and function of the energy control program and that the knowledge and skills required for the safe application, usage, and removal of energy controls are acquired by authorized individuals. Training shall include the following:

1. Each authorized individual shall receive training in 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.
2. Each affected individual shall be instructed in the purpose and use of the energy control program.
3. All other individuals whose work operations are or may be in an area where energy control procedures may be utilized shall be instructed about the procedure and about the prohibition relating to attempts to restart or reenergize locked out or tagged machines or equipment.
4. Supervising departments shall maintain a current list of authorized individuals. A copy of the list must be uploaded to SciShield and made available upon request.

Retraining Requirements

Retraining shall be provided for all authorized and affected individuals whenever there is a change in their assigned responsibilities, a change in machines, equipment, or processes that presents a new hazard, or when there is a change in the energy control procedure. Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever the supervising department has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures. The training shall reestablish an individual's proficiency and introduce new or revised control methods and procedures as necessary.

Training Recordkeeping

The supervising department will maintain all Lockout/Tagout records. These records must include Certification that an individual's training has been completed and is being kept up-to-date. The certification shall contain, at a minimum, each individual's name, the date(s) training occurred, and a summary of the training. Records of training must be retained for the duration of employment for faculty and staff and the duration of enrollment for students. Training records may be kept using the Lockout/Tagout Procedure Inspection Form in [Appendix C](#) or through a similar documentation system maintained by the department. All LOTO training records must be uploaded to and maintained in the Documents section of SciShield.

2.5 Academic & Research Operations General LOTO Procedures

All machinery and equipment that undergo Lockout/Tagout must have a written procedure before any work is performed. See [Appendix F](#) for an outline of the minimal written LOTO Procedure requirements.

Energy Isolation

Physical application of lockout or tagout on machinery or equipment shall be performed only by adequately trained authorized individuals. Authorized individuals are personnel identified by a supervising department as having the appropriate knowledge and skillset to effectively execute LOTO Procedures on a particular piece of machinery or equipment. No other student, staff, or faculty member may perform LOTO if the supervising department has not identified them as an authorized individual. All locks and lockout devices used in academic and research laboratories must be red and meet the requirements described in [Appendix G](#).

Tagout

Physical lockout is the most effective means of energy isolation and provides the highest degree of safety. Therefore, lockout is the preferred method and must be utilized whenever it is possible. There are instances where machinery/equipment cannot physically accept a lock. Only in these instances are tagout procedures permissible. When tagout systems are used, individuals must also be trained in the following:

1. Tags are warning devices affixed to energy-isolating devices. They do not physically prevent equipment operation as a lock does.
2. When a tag is attached to an energy-isolation point, it must only be removed by the authorized person responsible. A tag is never to be bypassed, ignored, or otherwise defeated.
3. Tags must be legible and understandable by all authorized individuals, affected individuals, and others whose work operations are or may be in the area.
4. Tags and their means of attachment must be made of materials that will withstand the environmental conditions encountered in the workplace.
5. Tags can provide a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
6. Tags must be securely attached to energy-isolation points so they cannot be inadvertently or accidentally detached during use.

See [Appendix G](#) for additional information on physical tag requirements and the accepted tag format.

LOTO Preparation

Survey the machine/equipment to locate and identify all energy isolation points. Consult all manufacturer documentation on energy isolation whenever possible. Be sure which switch(s), valve(s), or other energy-isolating devices apply to the equipment to be locked or tagged out. More than one energy source (electrical, mechanical, or others) may be involved.

Sequence of Lockout Tagout System Procedures

1. Notify all affected individuals that a lockout or tagout system will be implemented. The authorized individual must know the type and nature of the energy that the machine or equipment utilizes and fully understand the hazards.
2. If the machine or equipment is operating, shut it down using the normal stopping procedure (depressing the stop button, opening the toggle switch, etc.) as outlined in the SOP or operator manual.

3. Operate the switch, valve, or other energy-isolating device(s) to isolate the equipment from its energy source(s). Stored energy (such as that in electrical capacitors, springs, elevated machine components, flywheels, hydraulic systems, air, gas, steam, water pressure, etc.) must be dissipated or restrained by repositioning, blocking, bleeding down, etc.
4. Lockout and/or tagout the energy-isolation device(s) with assigned individual lock(s) and/or tag(s). Verify LOTO efficacy through the following steps:
 - a) Ensure that the machine or equipment is safe and that no personnel are exposed to any potential hazard.
 - b) Initiate a machine or equipment to verify that the LOTO Procedure rendered the equipment inoperable.
 - c) If the equipment can be operated from a remote station or computer control system, the authorized individual MUST verify that the equipment cannot start remotely.
 - d) Return ALL operating control(s) to the “neutral” or “off” position after the test has been completed.
5. The equipment is now locked out and tagged out.

Restoring Machines or Equipment to Normal Production Operations

1. After the servicing and maintenance is complete and the equipment is ready for normal operations:
 - a) Check and verify that all tools and materials used in the procedure have been removed and are accounted for.
 - b) Verify that all guarding devices have been adequately reinstalled.
2. Notify the affected individual(s) and check the area around the machines or equipment to ensure no personnel are exposed to any potential hazards.
3. All authorized individuals involved in the LOTO Procedure must remove their personal lockout and tagout devices.
4. After removing all LOTO devices, return the energy isolation devices to the normal position for machine or equipment operation.

Procedures Involving More Than One Person

In the preceding steps, if more than one individual is required to lockout or tagout equipment, each shall place their lockout or tagout device on the energy-isolating device(s). When an energy-isolating device cannot accept multiple locks or tags, a multiple lockout or tagout device (hasp) may be used. If lockout is used, a single lock may be used to lock out the machine or equipment, with the key placed in a lockout box or cabinet, which allows multiple locks to secure it. Each employee will then use their lock to secure the box or cabinet. As each person no longer needs to maintain lockout protection, that person will remove his/her lock from the box or cabinet (see “Group Lockout/Tagout” Section).

Periodic Inspection of LOTO Procedures

All LOTO Procedures for machinery or equipment must be inspected at least annually per [29 CFR 1910.147\(c\)\(6\)](#). PIs, technicians, and staff are responsible for conducting periodic LOTO procedure inspections of the machinery and equipment they are responsible for. See [Appendix D](#) for the Lockout/Tagout Procedure Inspection Form.

2.6 Group LOTO Procedure

When servicing and/or maintenance is performed by two or more authorized individuals, a procedure must be utilized that affords all involved personnel a level of protection equivalent to that provided by the

implementation of a personal LOTO device. All group LOTO written procedures must, at a minimum, meet the OSHA Group LOTO requirements found in [29 CFR 1910.147\(f\)\(3\)](#).

Some group LOTO operations may involve multiple authorized individuals and multiple energy-isolation points. In these situations, a primary authorized individual should be designated as the primary person responsible for all other authorized individuals working under the group LOTO device(s). Primary authorized individuals must possess high machine or equipment proficiency and experience and should be PIs or Technicians. The primary authorized individual must implement and coordinate the LOTO of hazardous energy sources and verify that the steps taken by the specific written energy control procedure have isolated the machine or equipment effectively from the dangerous energy sources. This must be accomplished before any additional authorized individuals participating in the group LOTO apply their lockout device (either at each energy-isolation device or to a group LOTO box) and before performing any servicing or work activities.

In addition to the primary authorized individual, each authorized individual participating in the group LOTO must be informed of their right to verify the effectiveness of the lockout measures and given an opportunity to personally verify that hazardous energy sources have been effectively isolated.

Each authorized individual must apply a personal lockout or tagout device to the group lockout device or group lockbox before they begin work. When they finish working on the machine or equipment being serviced or maintained, they must always remove those devices. Each authorized individual must understand the hazards of the work and how to control those hazards effectively. Furthermore, it is required that authorized individuals know the type and magnitude of the energy, the dangers of the power to be controlled, and the procedure to be used to control the hazardous energy.

Example of properly applied Group Lockout involving two authorized individuals.

One hasp is applied to a lockout point with two individual locks:



2.7 Personnel Change Procedure

Specific procedures must be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection. This shall include provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees.

Whenever work is being performed under group LOTO, outside the regular shift or working hours, a primary authorized individual must always be present. When changing shifts, the supervising department may, through an orderly transfer, designate a new primary authorized individual. This new primary authorized individual must attach their lockout device to the group LOTO device before the previous primary authorized individual removes their lockout device. The primary authorized individual will assume the responsibilities previously described.

Whenever work is performed over a period of time and is not continuous, the primary authorized individual must inspect the affected work area(s) to verify effective isolation before beginning work. Each applicable energy isolation point must be verified to ensure effective energy isolation.

2.8 Breach of Lockout/Tagout

Breach of LOTO involves the removal of a lock or tag by a person who does not own the lock or tag attached to a machine or piece of equipment. A Breach of LOTO Form (located in [Appendix E](#)) must be completed any time someone else's lock or tag must be removed. This includes circumstances when an authorized individual intends to remove and replace a LOTO device with their device. Breach of LOTO is a last resort procedure and must only be used in rare circumstances where the original owner cannot personally remove their lock or tag. Every effort must be made to contact the owner of the lock or tag and have them

remove it. The physical whereabouts of the lock/tag owner must be determined to ensure their safety. The machine or equipment must also be inspected to determine the current operational status. If the lock or tag owner cannot be notified before removal, they must be notified immediately upon return to the work location. Environmental Health and Safety must be consulted before completing a Breach of LOTO if the personnel identified in the Appendix E Breach of LOTO Form cannot be contacted or if any safety concerns arise during the procedure.

2.9 LOTO Alternatives

Specific machines and machine tasks may require frequent access to operating areas possessing potential hazardous energy. These tasks include making tool changes/adjustments, adjusting workpieces, clearing debris, etc. Alternative methods to standard LOTO measures may be utilized, provided they demonstrate equal or greater protection than LOTO. If alternative methods are to be used, they must be well-documented and included in the Standard Operating Procedure for the machine or equipment. Additionally, Environmental Health and Safety must approve all alternative LOTO methods before their implementation. Alternative approaches to LOTO will not be authorized where convenience is determined to be the reason for their implementation.

Appendices

Rowan University Academic & Research Operations

General Lockout/Tagout Procedures Summary

Lockout/Tagout Preparations

Survey the machine/equipment to locate and identify all energy isolation points. More than one energy isolation point may exist. Read and understand the written LOTO Procedure for locking/tagging out the machine/equipment.

Sequence of Lockout Tagout System Procedures

1. Notify all affected individuals that a lockout or tagout system will be implemented. The authorized individual must know the type and nature of the energy that the machine or equipment utilizes and fully understand the hazards.
2. If the machine or equipment is operating, shut it down using the normal stopping procedure (depressing the stop button, opening the toggle switch, etc.) as outlined in the SOP or operator manual.
3. Operate the switch, valve, or other energy-isolating device(s) to isolate the equipment from its energy source(s). Stored energy (such as that in electrical capacitors, springs, elevated machine components, flywheels, hydraulic systems, air, gas, steam, water pressure, etc.) must be dissipated or restrained by repositioning, blocking, bleeding down, etc.
4. Lockout and/or tagout the energy-isolation device(s) with assigned individual lock(s) and/or tag(s). Verify LOTO efficacy through the following steps:
 - a) Ensure that the machine or equipment is safe and that no personnel are exposed to any potential hazard.
 - b) Initiate a machine or equipment to verify that the LOTO Procedure rendered the equipment inoperable.
 - c) If the equipment can be operated from a remote station or computer control system, the authorized individual **MUST** verify that the equipment cannot start remotely.
 - d) Return ALL operating control(s) to the “neutral” or “off” position after the test has been completed.
5. The equipment is now locked out and tagged out.

Restoring Machines or Equipment to Normal Operations

1. After the servicing and maintenance is complete and the equipment is ready for normal operations:
 - a) Check and verify that all tools and materials used in the procedure have been removed and are accounted for.
 - b) Verify that all guarding devices have been appropriately reinstalled.
2. Notify the affected individual(s) and check the area around the machines or equipment to ensure no personnel are exposed to any potential hazards.
3. All authorized individuals involved in the LOTO Procedure must remove their personal lockout and tagout devices.
4. After all LOTO devices have been appropriately removed, return the energy isolation devices to the regular machine or equipment operation position.

Rowan University Group Lockout/Tagout Summary

Primary Authorized Individual Definition:

An individual designated by the supervising department is responsible for a set number of authorized individuals working on a machine or piece of equipment under a group LOTO device.

Responsibilities

The primary authorized individual must:

1. Implement and coordinate the LOTO of all hazardous energy sources.
2. Verify that the steps taken, per the specific written energy control procedure, have effectively isolated the machine or equipment from all hazardous energy sources.
 - a) This must be accomplished before authorized individuals participating in the group LOTO affix their personnel lockout device to the group LOTO device and before performing servicing or maintenance activities.
3. Inform each authorized individual participating in the group LOTO of their right to verify the effectiveness of the lockout measures and allow each authorized employee to personally verify that all hazardous energy sources have been effectively isolated.
 - a) In addition to the primary authorized employee, an authorized employee who verifies the effectiveness of the isolation measures must perform this verification after attaching their lockout device to the group LOTO device before performing any servicing or maintenance activities.
4. Provide for an orderly exchange of group LOTO with a new primary authorized individual when work continues over multiple shifts.
5. Whenever work is performed over time and is not continuous, the primary authorized individual must inspect the affected work area(s) to verify effective hazardous energy isolation before resuming work.

Appendix D – Lockout/Tagout Procedure Inspection Form

**Rowan University Academic & Research Operations
Lockout/Tagout Procedure Inspection Form**

Department:	Building:	Date:				
Location/Area:						
Machine/Equipment ID Information:						
Inspector Name:						
Authorized Individual(s) Involved:						
Lockout/Tagout Application				YES	NO	N/A
1) Have all Affected Individuals been notified that the machine/equipment would be Locked Out/Tagged Out?						
2) Have all hazardous energy sources and energy isolating devices been adequately located and identified?						
3) Was the machine/equipment shutdown procedure performed correctly?						
4) Have all energy isolating devices been operated so that hazardous energy sources are isolated?						
5) Have Lockout/Tagout devices been placed on energy isolation devices?						
6) Were the correct Lockout/Tagout devices used for the application?						
7) Has any stored energy been dissipated, restrained, or rendered safe?						
8) Has the machine/equipment been tested following the LOTO Procedure to verify the effectiveness of the LOTO application?						
9) Have all equipment/machine controls been returned to the off/neutral position after completing LOTO verification?						
10) Was the machine/equipment LOTO Procedure adequately followed?						
Lockout/Tagout Removal				Yes	No	N/A
11) Was the work area inspected to ensure that all tools were removed, all guards were reinstalled, all interlocks/safety devices were operational, and the area was clear of personnel and hazards before reenergizing equipment?						
12) Were all Affected Individuals informed that the machine/equipment was being returned to service?						
13) Were all LOTO devices removed by the Authorized Individuals who applied them?						
14) Were all energy isolation devices operated to restore machine/equipment energy?						
General Lockout/Tagout Requirements				Yes	No	N/A
15) Does the LOTO Procedure protect all Affected and Authorized Individuals appropriately?						
16) Were Authorized Individuals able to explain their responsibilities under the LOTO Procedure satisfactorily?						

Appendix E – Breach of Lockout/Tagout Form

Rowan University Breach of Lockout/Tagout Form

NOTE: This form is to be completed by the authorized individual performing the Breach of LOTO Task. Their Supervisor must also approve and sign off on this form.

Department:	Building:
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Location/Area:

Machine/Equipment ID Information:

Machine/Equipment Owner:

Owner Name of Lock/Tag to be Removed:

Provide Reason/Need for Breach of LOTO:

Breach of LOTO Questionnaire

Questions	YES	NO
Have the physical whereabouts of the owner of the lock/tag been verified?	<input type="checkbox"/>	<input type="checkbox"/>
Have all reasonable efforts been made to contact the owner of the lock/tag?	<input type="checkbox"/>	<input type="checkbox"/>
Has the owner been notified, or is a notification procedure in place to ensure that the owner is notified that their lock has been removed before he/she returns to work?	<input type="checkbox"/>	<input type="checkbox"/>
Has a qualified individual inspected the machine/equipment to ensure that the lock/tag can be removed safely without causing injury to personnel?	<input type="checkbox"/>	<input type="checkbox"/>

Note: Any “NO” answers to the above questions immediately halt the breach of LOTO. Contact Environmental Health and Safety for guidance before proceeding any further.

Is the existing lock/tag intended to be replaced by a lock/tag owned by a new authorized individual? If “YES,” provide the information below:

Name of New Authorized Individual:	Date Replaced:
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Will multiple lock/tag devices need to be removed, as in the case of machines/equipment with multiple hazardous energy sources?

Have all affected individuals (those in the vicinity of the machine/equipment or part of a group LOTO) been made aware of the LOTO breach?

Has the written LOTO Procedure been reviewed and understood by the authorized individual performing the Breach of LOTO?

I certify that all information provided on this form has been completed truthfully.

Notes/Comments:

Name & Signature of Authorized Individual

Time & Date

Name & Signature of Authorized Individual’s Supervisor

Time & Date

Upload the completed form to the Documents section of SciShield for recordkeeping.

Appendix F – Minimal Lockout/Tagout Procedure Outline

The following minimal lockout procedure outline has been adapted from [OSHA's Appendix A to 1910.147 – Typical Minimal Lockout Procedure](#). This document is provided to assist Authorized Individuals in developing their own documented procedures to meet the Academic & Research Operations LOTO Procedure requirements. When the energy isolating devices are not lockable, tagout may be used, provided the individual(s) comply with the provisions of this procedure, which require additional training and more rigorous periodic inspections. **NOTE:** For more complex systems, a more comprehensive Lockout/Tagout Procedure may need to be developed, documented, and utilized.

Lockout/Tagout Procedure

Identify the machine or equipment.

Purpose

This procedure establishes the minimum requirements for the lockout/tagout of energy-isolating devices whenever maintenance or servicing is done on machines or equipment. It shall ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before Authorized Individuals perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

Compliance With This Program

All individuals must comply with the restrictions and limitations imposed upon them during the use of lockout/tagout. Authorized individuals are required to perform the lockout/tagout according to this procedure. All individuals, upon observing a machine or piece of equipment that is locked out to perform servicing or maintenance, shall not attempt to start, energize, or use that machine or piece of equipment.

Sequence of Lockout

- (1) Notify all Affected Individuals that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

Identify the Name(s)/Title(s) of Affected Individuals and how to notify them of the LOTO operation.

- (2) The Authorized Individual(s) shall refer to the university procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, understand the energy's hazards, and know the methods to control the power.

Identify the type(s) and magnitude(s) of energy, its hazards, and the methods to control the energy effectively.

- (3) If the machine or equipment is operating, shut it down by the standard stopping procedure (depress the stop button, open the switch, close the valve, etc.).

Identify the type(s) and location(s) of all applicable machine or equipment operating controls. Consult machine or equipment manufacturer documentation and written SOPs for proper shutdown procedures.

(4) De-activate the energy-isolating device(s) so that the machine or equipment is isolated from the energy source(s).

Identify the type(s) and location(s) of all applicable energy isolating devices.

(5) Lock out the energy isolating device(s) with assigned individual lock(s).

(6) Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

Identify the type(s) of stored energy. Provide detailed information on the methods required to dissipate or restrain energy sources to ensure the safety of individuals working on the machine or equipment.

(7) Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed. Then, verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Describe the method required to verify the effective isolation of the machine or equipment.

(8) The machine or equipment is now locked out.

Restoring Equipment to Service

When the servicing or maintenance work is completed, and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken:

(1) Check the machine or equipment and the immediate area around the machine or equipment to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.

(2) Check the work area to ensure that all individuals have been safely positioned or removed from the area.

(3) Verify that the controls are neutral.

(4) Remove the lockout devices and reenergize the machine or equipment.

(5) Notify Affected Individuals that the servicing or maintenance is completed and that the machine or equipment is ready to be placed back in operation.

Appendix G – Lockout/Tagout Equipment and Tag Requirements

Per [29 CFR 1910.147\(c\)\(5\)](#), LOTO equipment and tags must be Durable, Standardized, Substantial, and Identifiable. The types of locks, tagout tags, and other LOTO equipment used in academic and research laboratories must remain consistent in color, appearance, and language. This ensures that all individuals encountering LOTO devices will understand the intent and take the appropriate precautions. Principle Investigators and Technicians having ownership of machinery/equipment affected by LOTO requirements are responsible for providing LOTO equipment that complies with OSHA and as described in this procedure. Only Authorized Individuals are permitted to apply LOTO equipment or tags to machinery or equipment in compliance with this procedure.

Requirements for Locks:

1. All padlocks utilized must be manufactured for the sole purpose of lockout. Under no circumstances may a traditional security padlock be used for LOTO purposes. Alternately, no padlocks intended for LOTO are permitted for use in general security applications (i.e., locking a storage locker).
2. All lockout padlocks must have a label with the name of the authorized individual who owns the lock securely affixed to the lock body.
3. The body of all lockout locks must be RED in color.
4. Only ONE key is permitted per lockout lock. That key is to always remain in the direct possession of the lock owner. No Exceptions.

Example of an Approved Lockout Padlock:



Example of a Standard Padlock Not Permitted for Lockout:



Requirements for LOTO Devices:

1. The color scheme used for all LOTO devices must be RED. LOTO devices include but are not limited to Hasps, Cable Locks, Circuit Breaker Locks, Valve Locks, etc.
2. The construction of all LOTO devices must be strong enough that they cannot be defeated/removed without the use of excessive force.

Lockout Device Examples:

Circuit Breaker Lockout Device:



Electrical Cord Lockout Device:



Lockout Hasp Device:



Appendix G – Continued

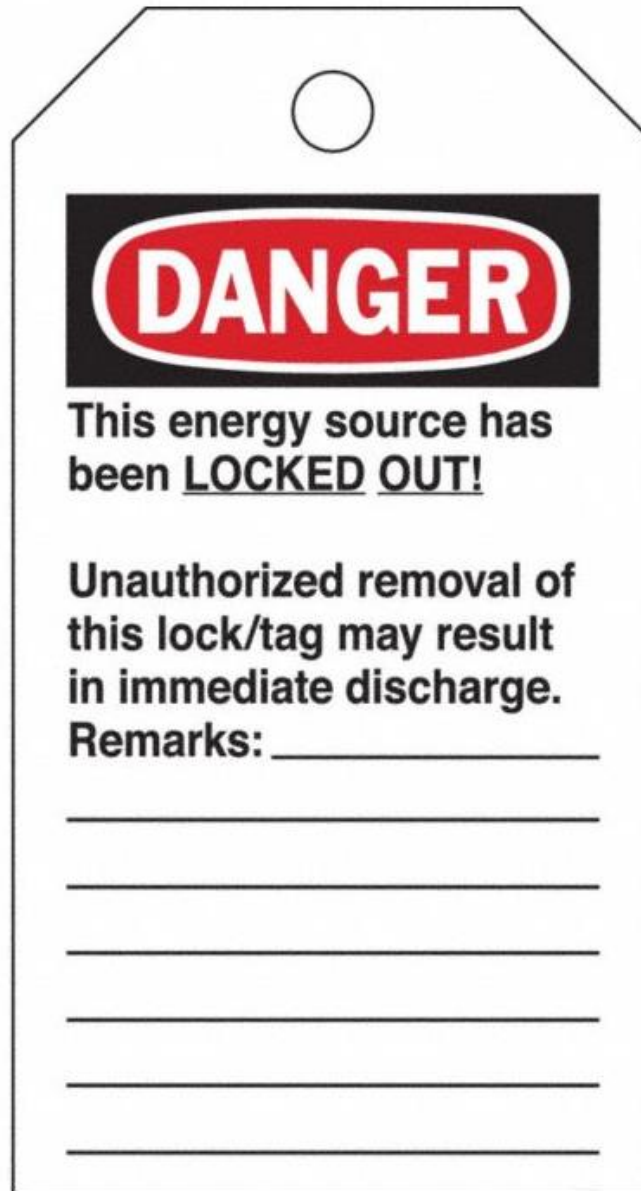
Requirements for Tags:

1. All tags must be printed on a durable material that will not deteriorate or become illegible during use.
2. Commercially produced tagout tags which provide the information depicted in **Figure 1** (Next Page) should be utilized when possible. Tags printed on standard paper must be printed in color and laminated to ensure adequate strength.
3. All information written on tags must be provided using permanent marker or equivalent means. Writing on tags must not be erasable or capable of becoming illegible during the intended use.
4. Tags must be secured to the tagout point using a means substantial enough to prevent accidental detachment. A nylon cable tie (or equivalent device) with a minimum tensile strength of 50 pounds must be used to secure tagout tags. These attachment devices must be single-use, capable of being secured by hand, self-locking, and non-releasable without being cut.

Example of a Properly Applied Lock & Tag Combination:



Figure 1: Approved Tagout Tag Format



Commercially available tags must be used when possible, for maximum durability. If printed on paper, tag must be in color and laminated.

The full name of the Authorized Individual along with the date of application must be provided. On the reverse of the tag, identify the machine/equipment undergoing LOTO, along with any other relevant information.

All fields provided on a tag must be completed.