UNIVERSITY OF MINNESOTA  
University Health and Safety  
LOCKOUT/TAGOUT (LOTO) PROGRAM  
The control of hazardous energy

Effective February 12th, 2018

**PURPOSE and SCOPE:**
The purpose of this program is to establish minimum safe work procedures for University personnel and contractors that are required to perform service or maintenance on machinery or equipment where unexpected energizing, start up or release of energy could occur and cause injury. Procedures contained within this Program are intended to prevent harm to personnel and contractors servicing and maintaining equipment by ensuring the equipment will be rendered safe to work on by dissipating and locking out and tagging out all energy sources. Departments or units may maintain their own site-specific programs that are at least equivalent to this program.

**DEFINITIONS:**

**Affected Employee** – Person who operates or uses equipment on which services or maintenance is being performed under Lockout Tagout (LOTO), or whose job requires them to work in an area where services or maintenance is being performed.

**Authorized Employee** – 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 servicing or maintenance requiring lockout tagout (LOTO).

**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.

**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 device, in accordance with an established procedure, insuring that the equipment being controlled cannot be operated until the lockout device is removed.

**Lockout Device** – A device that utilizes a positive means to hold an energy isolating device in a safe position and prevents the energizing of a machine or equipment. A uniquely-keyed lock, used only for LOTO, must be applied to each lockout device. A tag must be attached to each lock, to identify the authorized employee who applied the lockout device.

**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, which can be securely fastened to an energy isolating device to indicate the equipment being controlled may not be operated until the tagout device is removed. The device must be substantial enough to require a conscious effort to remove it. Each tagout device must identify the authorized employee who applied the device and the date of application.

**PROGRAM COMPONENTS:**
- General Lockout/Tagout (LOTO) Requirements
- Lockout/Tagout (LOTO) Procedure
- Group LOTO Procedure
- Authorized Removal of LOTO Device
- Inspection of LOTO Procedures
- Special Considerations
- Training
- Responsibilities

**General Lockout/Tagout (LOTO) Requirements**
This Lockout/Tagout program establishes energy control procedures, training, and periodic inspection requirements to ensure that before an employee services a machine or equipment, all potentially hazardous energy sources are isolated and rendered inoperative. The general requirements of this Lockout/Tagout program include:
A. The development of lockout/tagout procedures for equipment with single or multiple energy sources that include:
   - A specific statement of the intended use of the procedure.
   - Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment.
   - Specific procedural steps for the placement, removal, and transfer of lockout or tagout devices and the responsibility for them.
   - Requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other control measures.

B. Lockout/tagout materials including locks, tags, chains, wedges, key locks, or other hardware for the isolating, securing, or blocking of equipment from energy sources. The providing of lockout/tagout devices are the responsibility of the University and must meet the following criteria:
   - Capable of withstanding the environment to which they are exposed.
   - Lockout devices effectively lockout energy sources
   - Locks and tags are to be standardized and are to be used for LOTO only.
   - Lockout and tagout devices will identify the person applying the devices.
   - Lockout devices are to be substantial enough to prevent removal without the use of excessive force.
   - Tagout devices will:
     - Have standardized print and format.
     - Be substantial enough to prevent inadvertent removal.
     - Warn against the hazardous conditions if re-energized and shall include at least one of the following statements:
       - Do not start.
       - Do not open.
       - Do not close.
       - Do not energize.
       - Do not operate.

C. Annual inspections and training will be conducted as outlined in the INSPECTION OF LOTO PROCEDURES and TRAINING sections.

D. As specified in the UMN Electrical Safe Work Practices Standard, NO work may be performed on any electrical conductors and/or exposed equipment parts operating at 50 volts and above while they are energized. If equipment cannot be de-energized, as it create a greater hazard to deenergize and/or is not feasible, an Energized Electrical Work Permit must be completed and approved prior to any energized work. See Appendix D for Energized Electrical Work Permit.
LOCKOUT/TAGOUT (LOTO) PROCEDURE:
When Lockout/Tagout is performed, the authorized employee(s) is responsible to:

A. **Identify All Hazardous Energy Sources**
   - Plan the job, checking drawings and discussing with equipment operators and others as needed. Identify and locate all energy sources to be isolated for the specific equipment to be serviced.
   - Energy sources may include electrical, pneumatic, hydraulic, mechanical, thermal, chemical, radiation, steam, spring driven, suspended parts and residual energy.
   - When there are multiple sources of hazardous energy, complete and follow the Lockout Tagout Procedure (use Appendix A form) developed for that piece of equipment. The University of Minnesota’s Electrical Utilities Switching Procedures may be substituted for Appendix A.

B. **Notify All Affected Employees**
   - Notify any affected employees, Public Safety Emergency Communications Center (PSECC), and/or Facilities Management of plans to de-energize equipment to perform service or maintenance. If necessary, ensure shutdown of equipment has been coordinated with customer(s).

C. **Shut Down Equipment**
   - Shut down equipment to be serviced using normal stopping procedures.

D. **Isolate Energy**
   - Locate and operate all energy isolating devices for the equipment to be serviced to isolate and control the energy to the equipment. Energy sources may include electrical, pneumatic, hydraulic, mechanical, thermal, chemical, radiation, steam, spring driven, suspended parts and residual energy.
   - Push buttons, selector switches and other control type devices are not energy isolating devices.
   - Conductors and parts of electric equipment that have been de-energized but have not been locked out or tagged out in accordance with this standard shall be treated as energized parts.

E. **Attach Lockout/Tagout Device**
   - Each individual authorized employee and contractor with possible exposure to unexpected energizing, start up or release of energy is to apply their personal LOTO device to each energy isolating device
     - Ensure the LOTO devices have been attached to the energy isolating devices in a manner to prevent accidental re-energization.
   - Where a lockout device can not be utilized to hold the energy isolating device in a safe or off position, a tagout device is to be utilized.
     - Tagout Device – a Tagout device is to be utilized alone only when the energy isolating device will not accept a lockout device.
     - Where a tag cannot be affixed directly to the energy isolating device, the tag is to be located as close as is safely possible to the device, in a
position that will be immediately obvious to anyone attempting to operate the device.

F. Release Stored and Residual Energy
   • After the LOTO devices are applied to all energy control devices, disconnect, drain, block and/or release all stored and residual energy sources for the equipment to be serviced. If stored energy can reaccumulate, verification of the isolation shall continue as long as necessary.

G. Verify Isolation
   • Prior to beginning service on equipment where LOTO procedures have been applied, verify that all energy sources have been isolated and de-energized. Test for voltage when working on electrical equipment.
   • Verify LOTO devices effectively prevent accidental re-energization

H. Perform Service/Maintenance
   • After verification of isolation, perform service/maintenance on the equipment. All LOTO energy isolation devices will remain in place during the servicing and maintenance operations.

I. Release from LOTO
   • After service/maintenance has been completed and prior to removing LOTO devices or restoring energy to the equipment:
     o Clear and inspect the work area to ensure all tools, supplies and nonessential items have been removed and the equipment is operational.
     o Ensure all employees have been safely positioned or removed and all affected employees (including PSECC or Facilities Management) have been notified of re-energization.
     o Ensure operating controls are in the off position.
     o Each worker is to remove their own LOTO device from each energy isolating device.

J. Restore Energy and Re-Energize Equipment
   • After LOTO devices have been removed from every energy-isolating device, energy can be restored and the equipment can be re-energized.
     o Verify service and maintenance completed was effective.
     o Ensure restored energy sources are intact, operating properly and guards are in place.

GROUP LOTO PROCEDURE
   • When service on equipment is to be performed by University or contracted employees in a group, crew or department where there is exposure to unexpected energizing, start up or release of energy, Group LOTO devices can be utilized. Each individual will still need to apply their own lock. A multi-lock lockout device should be used where possible, so that each individual’s lock is applied to
the lockout device. If such a device can not be accommodated, use the following procedure:

- A lead authorized employee performing service on the equipment will follow the LOCKOUT/TAGOUT (LOTO) PROCEDURE (above). They will document the procedure for the specific equipment to be serviced on the Lockout Tagout Procedure form (Appendix A).
- Keys for each LOTO device applied will be placed in a Group LOTO box.
- The lead authorized employee will then place their personal LOTO lock to the outside of the Group LOTO box.
- Each authorized employee performing service on the equipment will verify the LOTO procedure and place their personal LOTO lock on the outside of the Group LOTO box.
- LOTO will remain in place while any of the personnel are performing service or maintenance on the equipment.
- After service is completed, the equipment will not be released from LOTO until all authorized employees have removed their personal LOTO lock from the Group LOTO box and the LOTO devices have been removed from each energy-isolating device.

**AUTHORIZED REMOVAL OF LOCKOUT TAGOUT DEVICE**

If the authorized employee who applied the LOTO device is not available to remove the device, the LOTO device will be removed by the authorized employee’s supervisor using the following documented steps:

A. Verify the authorized employee who applied the devices is no longer at the worksite.
B. Make reasonable efforts to contact the authorized employee to inform them that their LOTO device has been removed.
C. Inform the authorized employee prior to their next shift that their LOTO device has been removed.
D. Document all steps on Appendix B: LOTO Device Removal Request form.

**INSPCTION OF LOTO PROCEDURES**

Supervisors will conduct a documented periodic inspection of the energy control procedures for the equipment under their supervision at least annually to ensure the procedure and requirements of the LOTO Program are being followed. At a minimum, the periodic inspection (see Appendix C: Periodic LOTO Procedure Inspection Form) will document:

- The machine or equipment that the energy control procedure was being utilized,
- The date of the inspection,
- The employees included in the inspection, and
- The person performing the inspection.

**SPECIAL CONSIDERATIONS**

Specific procedures will be utilized during unusual circumstances to ensure continuity of the LOTO Program.

- Shift Changes
• During changes involving authorized employees it is the responsibility of the departing authorized employee(s) involved with the locked or tagged out equipment to ensure that the continuity of the energy control procedure is maintained until the on-coming authorized employee(s) arrives. The continuity of the program is maintained through the authorized employee(s) specific lock and tag until the next authorized employee(s) immediately apply their own locks and tags.

• **Shutdown (not servicing or maintenance) of Equipment**
  
  o There are times when equipment is shut down for extended periods of time as in seasonal shutdowns. If there is no servicing or maintenance being done on that equipment, LOTO is not required, but a department specific lock and tag will then be secured to the energy isolating device by an authorized employee or Supervisor.
  
  o The authorized employee will reattach their personal LOTO device anytime service will be completed on the de-energized equipment, and must verify that all energy sources are still isolated and de-energized.

**TRAINING:**

The University is to provide training to ensure that the purpose and function of the LOTO Program is understood and that personnel with knowledge and skill are available for safe application, usage, and removal of energy control as necessary.

- Authorized employees shall be trained to recognize the applicable hazardous energy sources, the type and magnitude of energy sources, and the proper techniques for energy isolation and control.
- Affected employees shall be instructed in the purpose and use of the energy control procedure.
- Other employees whose work may be in areas where energy control is utilized shall be instructed about the procedure and the prohibition against restarting machines which have been locked/tagged out.
- Authorized and affected employees shall be retrained when their assignment changes, when equipment changes, or when energy control procedures change. Retraining is also required when a periodic inspection reveals inadequacies in the program.
- Managers and supervisors verify that documented training has been accomplished.

**RESPONSIBILITIES:**

**Managers**

- Assure this LOTO Program is implemented by supervisors and employees assigned to service or maintain equipment where unexpected energizing, start up or release of energy could occur and cause injury.

**Supervisors**
• Ensure that written equipment-specific LOTO procedures, in accordance with Appendix A, are completed for multi-step LOTO protocols. The written procedures must be revised/updated to reflect the changes.
• Assure the LOTO Program procedures are implemented by all authorized and affected employees under their supervision.
• Ensure the necessary equipment is readily available for employee use.
• Ensure all authorized and affected employees have attended initial LOTO training and any refresher LOTO training thereafter.
• Review the energy control procedures for equipment under their supervision at least annually to ensure the procedures and provisions of the LOTO Program are being followed.

Authorized Employees
• Understand and follow the LOTO Program safe work procedures.
• Participate in the initial and refresher LOTO training sessions.
• Immediately report any unsafe LOTO hazards or situations to your supervisor.

Affected Employees
• Participate in the initial and refresher LOTO training sessions.
• Immediately report any unsafe LOTO hazards or situations to your supervisor.
• As Affected Employees, respect LOTO devices in use and do not disturb them.
• Be aware of LOTO devices in their work area.
• If making contact with or altering LOTO devices in any way, notify authorized LOTO device owner immediately to re-assess the effectiveness of LOTO device.

APPENDICES:
A – LOTO Procedure Form
B – LOTO Device Removal Request
C – Periodic LOTO Procedure Inspection Form
D – Energized Electrical Work Permit form

Legal Reference: 29CFR 1910.147
APPENDIX A
UNIVERSITY HEALTH & SAFETY LOCKOUT PROCEDURE

Equipment Name: ___________________________ Date Written: ___________________________
Operating Unit: ___________________________ Date Revised: ___________________________
Location: ___________________________ _________________

**LOCKOUT STEPS**
1. Determine responsibilities – Pre Job Plan.
2. Know the types and magnitude of hazardous energy.
3. Notify affected employees
4. Shut down/turn off the equipment.
5. Isolate the equipment from hazardous energy.
6. Apply the lockout - devices/locks.
7. Relieve stored energy.
8. Verify isolation – try to start the equipment.

**RELEASE FROM LOCKOUT**
1. Remove tools, materials, and equipment
2. Check work area.
3. Make sure all employees are safely positioned and notified.
4. Ensure operating controls are in “OFF” position
5. Remove locks and devices, and energize.
   - Personal locks may only be removed by their owners. For exceptions follow LO/TO program for removal of LOTO devices by other than Authorized Employee.

List Hazardous Energy including order of magnitude (ex. volts, psi, temperature)

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LOCKOUT STEPS, CONTINUED

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**VERIFY ISOLATION – TRY TO START Equipment**

**COMMENTS AND SUGGESTED REVISIONS:**

**VERIFY JOB IS COMPLETE AND ALL LOCKS HAVE BEEN REMOVED**

| SIGNATURE: | DATE: | TIME: |
APPENDIX B
UNIVERSITY HEALTH & SAFETY LOTO DEVICE REMOVAL REQUEST

If the authorized employee who applied the LOTO device is not available to remove the device, the LOTO device will be removed by the authorized employee’s supervisor using the following documented steps:

Check appropriate boxes:

☐ 1. Individual whose LOTO device will be removed has been personally contacted. Method used to contact individual (e.g. work cell phone, pager, personal cell phone, etc.)?

______________________________     _________________________
Method Date/Time

☐ 2. Supervisor personal lock – contact Shift Supervisor. Foreman personal lock – contact General Foreman.

☐ 3. Unable to contact individual.

If #3 above is checked, complete the following steps:

☐ A. Called employee at home. Spoke to: ______________________ ______________

Name Date/Time

☐ B. Talked to fellow crew members:

______________________     ______________
Name Date/Time

______________________     ______________
Name Date/Time

☐ C. A standby person will be stationed by the work location or point of exposure until the equipment is running.

By virtue of our signatures below, we attest to the fact that, to the best of our knowledge, the owner of this LOTO device is not at the University.

The employee whose LOTO Device has been removed will be notified prior to start of next shift.

________________________________________            ___________
Supervisor/Foreman Signature Date

________________________________________            ___________
Witness Signature Date
APPENDIX C

UNIVERSITY HEALTH & SAFETY PERIODIC LOTO INSPECTION FORM

Operating Unit: ____________________________ Date: _______________________________
Inspector Name: ___________________________ Time: _______________________________
Equipment Name: __________________________ Location: ____________________________
Procedure Name/Number: _____________________________________________________________

1. Yes No LOTO procedure is written for the equipment.  
If No, contact supervisor to develop procedure.

2. Yes No Proper LOTO procedure for equipment is posted at the work site.

3. Yes No All applicable procedure steps are initialed and completed, or an explanation is written in 
the comment section explaining why a step was skipped.  
If No, STOP work immediately and contact Lead individual to verify and correct.

4. Yes No All energy isolation points identified on the procedure appropriately shut off and LOTO 
device applied with authorized employee’s personal lock and tag.  
If No, STOP work immediately and contact authorized employee to turn off all energy 
isolation points and apply LOTO device(s).

5. Yes No All authorized employees who are working on the equipment have their personal LOTO 
device attached to each energy isolation point or group LOTO box.  
If No, STOP work immediately and contact authorized employee(s) to apply their 
personal LOTO devices.

Review inspection results and responsibilities with each Authorized Employee.

Inspector Signature: __________________________________________________________

Name of Authorized Employees performing work on the equipment:

_________________________________________     _________________________________________
_________________________________________     _________________________________________
_________________________________________     _________________________________________
_________________________________________     _________________________________________
_________________________________________     _________________________________________
# Energized Electrical Work Permit

## Work Order

<table>
<thead>
<tr>
<th>Work Order #</th>
<th>Date Work To Be Completed:</th>
<th>Time Work To Start:</th>
<th>End:</th>
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</table>

## Description of work:

### Specific Location:

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<tr>
<th>BLDG:</th>
<th>Room #:</th>
<th>Maximum Voltage:</th>
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## Work on energized electrical equipment is justified because de-energizing:

- [ ] Introduces additional hazards. Explain:
- [ ] Introduces increased hazards. Explain:
- [ ] Not feasible due to equipment design. Explain:
- [ ] Not feasible due to operational limitations. Explain:
- [ ] Other. Describe:

## Risk Category

*Refer to the U of M Electrical Safe Work Practices Standard (Circle One)

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## Safe Work Requirements:

- [ ] Safety Pre-Task Plan Card (SPPC) completed. Attach to this permit.
- [ ] Qualified personnel assigned to perform work.
- [ ] Standby person, equipped with insulating equipment needed for emergency response is provided.
- [ ] Communication equipment is available and operating.
- [ ] Conductive items are removed (such as metal rings, jewelry, watches, buckles, badge holders, etc.)
- [ ] Personal protective equipment provided as identified on SPPC.
- [ ] Voltage-rated insulated tools are provided.

- [ ] Insulating protective equipment to be used:
  - o Rubber insulated matting
  - o Rubber blankets
- [ ] Testing equipment at the worksite is compatible with the voltage present.
- [ ] Shock Hazard Analysis
- [ ] Shock Protection Boundaries Analysis
  - o Limited Boundary
  - o Restricted Boundary
  - o Prohibited Boundary
- [ ] Results of the Arc Flash Analysis
- [ ] Determine the Arc Flash Boundary
- [ ] Other:

## Electrician Requestors

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<tr>
<th>Electrician Signature:</th>
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<td>Supervisor Signature:</td>
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## Authorization

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<td>Management Authorization**:</td>
<td>Date:</td>
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- [ ] Permit Denied. Supervisor coordinates alternative to complete work.
- [ ] Permit Approved. Electrician completes SPPC and obtains equipment necessary to complete work.

## FM Store Room Use

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<tbody>
<tr>
<td>Date Electrical PPE and Insulated Tools Returned</td>
<td>Stores Clerk Initials</td>
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*When work has been completed, forward original copy of Permit to your UHS Representative with SPPC & Work Order attached.

**Management Authorization is the highest level of that University Department or District.