



Department of Environmental Health & Safety

Energy Control and Power Lockout Program for Facilities Management

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1. INTRODUCTION

In order to protect personnel from the unexpected energization or start up of equipment during maintenance/repair activities, the Lockout/Tagout Standard, 29 CFR 1910.147, was created by the Occupational Safety and Health Administration. Drexel University's written Energy Control and Power Lockout Program was written to comply with these regulations and to ensure that hazardous isolating devices have been properly identified and that all equipment has been properly isolated and locked or tagged out before employees perform any maintenance/repair work.

2. OBJECTIVE

This procedure establishes the minimum requirements for energy control and power lockout. This program provides the required safe practices that shall be followed by each employee when working on or near machines or equipment where unexpected movement, energization of electrical systems, release of stored energy, or the flow of gases or fluid may have the potential to endanger personnel. When such conditions exist, precautions shall be taken to ensure that the energy from a machine/equipment is properly controlled and/or isolated from all potentially hazardous energy before maintenance activities begin.

3. SCOPE

This program was written to satisfy the federal requirements regarding energy control and lockout/tagout procedures, OSHA stand 29 CFR 1910.147. All university employees are required to comply with this written plan.

4. DEFINITIONS

Affected Person: A person whose job requires that they operate or use a machine or equipment on which maintenance or service is being performed; or whose job requires that they work in an area in which maintenance or service is being performed

Authorized Person: A knowledgeable individual to whom authority and responsibility to perform a specific assignment has been given by the employer or designee.

..."**capable of being locked out**": an energy isolating device which has, either by design or other attachment or integral part through which a lock can be affixed. Lock-out should be possible without dismantling, rebuilding or replacing the energy isolating device or permanently alter the energy control capacity.

Energized: Connected to an energy source that does or may contain residual or stored energy.

Energy Isolating Device: A physical device that prevents the transmission or release of energy, including but not limited to; circuit breakers, disconnect switches, manually operated switches, slide gates, slip blinds, line valves, blocks and similar devices used to block or isolate energy. *Push buttons, light & selector switches, timers and similar are not energy isolating devices.*

Energy Isolation Verification: The operation or testing of the equipment, machine or process (*push buttons, switches, timers etc.*) that will determine whether or not the energy isolation was effective. This process will detect, relieve, disconnect, or restrain any residual or stored energy.

Energy Source: Any source of chemical, electrical, hydraulic, mechanical, nuclear, pneumatic, radioactive (laser or x-ray), thermal, or other type of energy.

Hot Tap: A procedure used in the repair, maintenance and service activities which involves welding on a piece of equipment (pipelines, vessels, tanks etc.) under pressure in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without interruption of air, chemical, gas, steam or water distribution systems. This may include an electrical tap to an existing live electrical feeder, using piercing connectors.

Lock-Out: Placement of a lock on an energy isolating device, which insures that the energy isolating device and the equipment, machine and/or process being controlled can not be operated until the lock has been removed by the qualified person who initially installed it.

Lock-Out Device: An approved device which may or may not include a hasp capable of withstanding the environment it shall be exposed to, and that incorporates a lock and a key that will hold an energy isolating device in the safe position, to protect all affected personnel.

Maintenance and Servicing: Activities including but not limited to; adjusting constructing, inspecting, installing, maintaining, modifying or setting up equipment, machines or processes. This can include adjusting, cleaning, lubricating or unjamming of equipment or machines, where the employee may be exposed to unexpected energization or start-up of the equipment, machines or processes, or the release of any type of hazardous energy.

Qualified Person: An individual who has the appropriate education, experience and training to work in and around the equipment, machinery or process, and knows the effect of operating the controls or equipment.

Substantial: Lock-out devices shall be strong enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tool. **Tag-out devices** shall be strong enough to prevent inadvertent or accidental removal. The attachment of these devices shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of 50 lb. force.

Tag-Out: Placement of a tag on an energy isolating device that indicates that the energy isolating device and the equipment being controlled must not be operated until the tag has been removed by the qualified person who initially installed it.

Tag-Out Device: a prominent warning device, such as an approved tag and a means of attachment which can be securely fastened to the energy isolating device. The tag shall be a two part, perforated tag with the word "Danger" prominently displayed. The tag shall indicate the energy isolating device and equipment being controlled. The tag-out device shall also be capable of withstanding the environment to which it is exposed, exterior or interior.

5. RESPONSIBILITIES

A. Drexel University Safety and Health Department is responsible for the coordination and implementation of the overall Energy Control and Power Lockout Program, with specific responsibility for:

- Implementing the Drexel University Energy Control and Power Lockout Program.
- Enforcing the Drexel University Energy Control and Power Lockout Program and insuring compliance with the procedures in their department.
- Provide training for employees affected by the Energy Control and Power Lockout Program.
- Monitoring the compliance of this procedure and conducting the annual inspection and certification of the authorized employees.

B. Department Supervisors Actual implementation of the program is the responsibility of the individual department in which relative employees work. These responsibilities include:

- Enforcing the Drexel University Energy Control and Power Lockout Program and insuring compliance with the procedures in their department.
- Ensure that new or transferred employees are instructed in the purpose and use of the lockout or tagout procedures.

C. Employees

- Authorized employees (those contained in Appendix A) are responsible to follow established lockout/tagout procedures.
- Affected employees (all other employees in the facility) are responsible for insuring they do not attempt to restart or re-energize machines or equipment which are locked out or tagged out.

6. ENERGY CONTROL AND POWER LOCKOUT IDENTIFICATION

The University Safety and Health Department will conduct a survey throughout the campus to locate and identify all equipment which may require lockout. A label will be affixed to the equipment/machine stating the machine must be locked out before servicing. Copies of the general lockout procedures will be available at each lockout center to aid in the application. A written lockout procedure will be established for specific equipment, when stored or residual energy exists after shut down and could endanger employees.

7. GENERAL LOCKOUT METHODS

All equipment shall be locked out or tagged out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. **DO NOT attempt to operate any switch, valve, or other energy isolating device where it is locked or tagged out!**

- A. The authorized employee shall be familiar with the machine/equipment being serviced before work begins. Notify all affected employees that energy control and power lockout procedures are being utilized.
- B. Shut off the power of the machine/equipment at the control panel.
- C. All energy control devices that are needed to control the machine/equipment shall be physically located and operated in such a manner as to isolate the machine/equipment from the energy source(s).
- D. Attach the lock with a danger tag at the disconnect point for the energy source being locked out. When more than one person is working on a machine/equipment, a multiple lockout device must be used on each disconnect to be locked out. The lockout rule states, each person working on the equipment should attach his/her own lock to each energy source requiring it. For example: a plumber and electrician are assigned to a machine with two energy sources. According to the rule, each worker shall apply two locks on each energy source, giving a total of four locks. This concept will be further explained in the lockout training.
- E. Following the application of lockout devices to energy control devices, all potentially stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.
- F. After ensuring that all personnel are clear, verify the lockout and/or control procedures by attempting to restart the machine/equipment. The equipment/machine shall not operate.
Caution: Return operating control(s) to the “off” position after the verification procedure!
- G. The equipment/machine is now properly locked out.

8. SEQUENCE OF LOCKOUT

- A. Notify all affected employees that servicing or maintenance is required on a machine or piece of equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
- B. The authorized employee shall refer to the University’s procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall

understand the hazards of the energy, and shall know the methods to control the energy.

- C. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress top button, open switch, close valve, etc.)
- D. De-activate the energy isolating device(s) with assigned individual lock(s).
- E. Lock out the energy isolating device(s) with assigned individual lock(s).
- F. 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.
- G. Ensure 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.
Caution: return operating control(s) to neutral or “off” position after verifying the isolation of the equipment!
- H. The machine is equipment is now locked out.

9. SPECIFIC LOCKOUT METHODS

Lockout Electrical Power

When the electrical disconnect is attached or adjacent to the equipment, the motor stop button shall be depressed, the disconnect handle should be placed in the “off” position and the lock applied. The disconnect handle should be operated while standing to one side of the disconnect rather than in front of the switch. Verify the lockout procedure by operating the start/stop switch to verify isolation. A danger tag will be affixed with the lock as a supplement, not as a substitute for a lock.

Release Compressed Gas, Water, Steam, or Chemicals

Compressed gas, water, steam, or chemical pressure shall also be shut off and locked out, if such a pressure could result in unexpected movement of equipment components. Check gages for zero pressure (do not rely solely on gages). Listen for vented pressure or let a qualified person open fittings if necessary.

Dissipate Rotation

Wait until all rotating components of machine have stopped moving. This includes items such as fly wheels, grinder wheels, circular saws, etc.

Control Gravity

Physically block or restrain affected machine parts with approved blocks, pins or chains.

10. 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 his/her own 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 may be used. If lockout is used, a single lock may be used to lockout the equipment with the key being placed in a lockout box or cabinet which allows the use of multiple locks to secure. Each employee will then use their own lock to secure the box or cabinet. As each person no longer needs to maintain his or her lockout protection, that person will remove his/her lock from the box or cabinet.

11. RESTORING EQUIPMENT TO SERVICE

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

- A. Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
- B. Check the work area to ensure that all employees have been safely positioned or removed from the area.
- C. Verify that the controls are in neutral.
- D. Remove the lockout devices and reenergize the machine or equipment.
Note: the removal of some forms of blocking may require energization of the machine before safe removal.
- E. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

12. ABANDONED LOCKOUT REMOVAL PROCEDURES

The following actions shall be taken upon notification of an abandoned lock:

- A. The department manager must be notified of the location and identity of equipment.
- B. The department manager will identify the owner of the lock through his/her records or by the danger tag.

- C. The department manager will contact the lock owner to make sure it was applied by him/her. The employee will be asked to remove the lock if all work is completed.
- D. In the event of an emergency, if the employee is unable to remove his/her lock(s), the manager of the department can make the decision to remove the lock. The manager's decision will be based on a hazard evaluation of the equipment to ensure it is safe to use. The employee shall be contacted upon arrival to work that his/her lock was removed.

13. TRAINING

Employee training for Drexel University will be given to all supervisors and employees to whom this procedure applies. Training will precede any employee servicing or maintenance on a machine where the accidental start up or release of stored energy may endanger the employee. A list of the job classification of employees required to attend the training program will be included in Appendix A.

14. OUTSIDE CONTRACTORS

Outside contractors are required to perform lockout when working on or near machines or equipment where the unexpected movement, energization of electrical systems, release of stored energy, or the flow of gases or fluid could have the potential to endanger personnel. Notification of the policy will be covered in the Drexel University Contractor Safety Manual.