

Duquesne University

LOCKOUT/TAGOUT PROGRAM

*Effective January 1, 2003
Revised October 2008*

Prepared by: Environmental Health and Safety Department

Purpose

This program defines responsibilities and establishes procedures for the lockout/tagout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. These procedures must be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could occur.

Scope

This program will cover the following requirements:

- Regulatory Requirements;
- The Role of Employees;
- Outside Personnel, Contractors and Sub-Contractors;
- Employee Training and Retraining;
- Protective Materials and Hardware;
- Written Procedures for Lockout/Tagout;
- General Procedure for Lockout/Tagout;
- Testing of positioning of Machines or Equipment;
- Restoring Equipment to Service;
- Alternate Procedure for Lockout/Tagout Device Removal;
- Procedure for Group Lockout/Tagout;
- Procedure for Shift or Personnel Changes;
- Annual Program Review;
- Definitions; and
- A Model Lockout/Tagout Form.

Introduction

Lockout/tagout programs are designed to prevent accidental startup of machines or equipment, and to prevent the release of stored energy during servicing or maintenance. Through the use of specific procedures that involve applying locks and/or tags, equipment is isolated from energy sources and injuries to workers are prevented. While lockout is the preferred method of isolating machines or equipment from energy sources, tagout is permitted when the energy isolating devices are not lockable. Tagout may not be used when the energy isolating devices are lockable. For complex systems, OSHA requires specific written procedures (Appendix A).

Regulatory Requirements

An employer's lockout/tagout program must be developed to meet the Occupational Safety and Health Administration's (OSHA) requirements found in 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout), and 29 CFR 1910.333, Selection and Use of Work Practices (Electrical Safety-Related Work Practices). For complex systems, OSHA requires the employer to develop specific written procedures.

The Role of Employees

Employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout/tagout. An AFFECTED EMPLOYEE is anyone whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

An AUTHORIZED EMPLOYEE is anyone who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance.

Only authorized employees may lockout or tagout equipment. An authorized employee must notify affected employees (whose work activities are affected by the lockout/tagout procedure) before the procedure is used and when the machine or equipment is returned to service.

Outside Personnel, Contractors or Sub-Contractors

This program also covers outside personnel, contractors and sub-contractors involved in service or maintenance operations on University property. Outside personnel, contractors and sub-contractors are required to follow this program and the University Project Supervisor is to ensure compliance. University Project Supervisors overseeing outside personnel, contractors or sub-contractors will notify those personnel of this procedure and the requirements to comply with it.

Employee Training and Retraining

All authorized and affected employees must receive initial training as required. Employees must undergo additional training whenever there is a change in job assignment, a change in machines, equipment, or process that presents a new hazard, or a change in this lockout/tagout program. Refresher training will be conducted annually to ensure detailed knowledge and understanding of this Lockout/Tagout Program and to ensure safe work practices are followed.

Protective Materials and Hardware

University Departments must provide employees with the necessary protective materials and hardware to perform lockout/tagout. This may include locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware. All devices used for lockout/tagout must be properly identified and must not be used for any other purposes. Lockout/tagout devices must also meet the following requirements:

1. Durable – Lockout/tagout devices must be capable of withstanding the environment to which they are exposed for the entire period of time that they are used. Tagout devices must be constructed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible. Tags must not deteriorate when

used in corrosive environments, such as areas where acid and alkali chemicals are used or stored.

2. Standardized – Lockout/tagout devices must be standardized within each department using at least one of the following criteria: Color; shape; or size; and, in the case of tagout devices, print and format.
3. Substantial - Lockout devices must be substantial 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 tools. Tagout devices must be substantial enough to prevent inadvertent or accidental removal. Tagout devices must be attached with nylon cable ties that are non-reusable, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds.
4. Identifiable - Lockout/tagout devices must identify the employee applying them.
5. Wording - Tagout devices must warn against hazardous conditions if the machine or equipment is energized and include a wording such as the following: "Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate." All tagout devices must contain the name of the employee conducting the initial lockout/tagout, the date, and their immediate supervisor's name and telephone number.

Written Procedures for Lockout/Tagout

Department supervisors must develop written procedures for the lockout/tagout of each piece of equipment or machine under their control. A model written procedure (Appendix A) is attached to the end of this program. However, specific written procedures for a particular machine or piece of equipment are not required if ALL of the following elements exist:

1. The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees,
2. The machine or equipment has a single energy source which can be readily identified and isolated,
3. The isolation and locking out of that energy source must completely deenergize and deactivate the machine or equipment,
4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance,
5. A single lockout device must achieve a locked-out condition,
6. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance,
7. The servicing or maintenance does not create hazards for other employees, and
8. The department, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

General Procedure for Lockout/Tagout

Lockout/tagout must be performed in accordance with this program whenever specific written procedures are not required. See Written Procedures for Lockout/Tagout for information on when specific written procedures are required.

1. Notify appropriate affected employees 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.
2. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).

3. De-activate the energy isolating device(s) (switches, valves, circuit breakers, etc.) so that the machine or equipment is isolated from the energy source(s).
4. Lock or tag out the energy isolating device(s) with assigned individual lockout/tagout device(s). Note: If a tag is used without a lockout device to isolate an electrical circuit, it must be supplemented by one additional safety measure such as the removal of an isolating circuit element, blocking of a controlling switch, or opening an extra disconnecting device. The phase conductors should be removed from circuit breakers, switches, starter, etc... to ensure total isolation of the electrical current and the accidental energization of the machine or equipment. The Facilities Management's Supervisor of Mechanical/Electrical Maintenance (telephone # 412-396-4021) may be contacted for assistance.
5. Dissipate or restrain 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.) by methods such as grounding, repositioning, blocking, bleeding down, etc.
6. 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.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

Note: A qualified person (see Definitions) must verify that all electrical circuit parts to which employees may be exposed during service or maintenance are deenergized through the use of test equipment. This test must also determine if any energized condition exist due to inadvertently induced voltage or unrelated voltage feedback even in circuits that have been de-energized and presumed safe. If the circuit to be tested is over 600 volts, the test equipment must be checked for proper operation before and immediately after the test. All test equipment must be tested on a known energized circuit before and after testing the circuit to be worked on.

The machine or equipment is now locked or tagged out.

Notification

Monday - Friday Daylight Shift (Normal Maintenance Conditions)

Before any equipment is locked out or tagged out, the employee must notify their immediate supervisor. There must be an agreement as to the specific machine or equipment to be removed from service. Facilities Management supervision will authorize the installation of the lockout/tagout device. Inform Facilities Management front desk to fill out LOTO Log Book.

Monday - Friday Daylight Shift (Emergency Maintenance Conditions)

The employee will lockout/tagout the machine or equipment from service. The employee will then notify their immediate supervisor as to the application of the lockout/tagout device. Facilities Management supervision will authorize the installation of the lockout/tagout device. Inform Facilities Management front desk to fill out LOTO Log Book.

All Off-Shifts and Weekends

The employee will lockout/tagout the machine or equipment from service. The employee will then document the application of the lockout/tagout device on the LOTO Log Book and the S-1 Report.

The employee will also notify the next employee coming on duty to relieve him/her about the application of the lockout/tagout device. Procedures for Shift or Personnel Changes will then be followed (page 7).

Documentation

After each proper application of the lockout/tagout device, the employee will document the application of the device on the Lockout/Tagout Log Book (Appendix B). After each proper removal of the lockout/tagout device, the employee will document the removal of each device on the Lockout/Tagout Log Book. For group lockout/tagout, each device will be identifiable as to which employee owns the device and all employees will be listed in the Lockout/Tagout Log Book. Each supervisor will be responsible for ensuring that his/her employees update and maintain the Facilities Management's Lockout/Tagout Log Book for every application and removal of a lockout/tagout device. The Lockout/Tagout Log Book will be at the Facilities Management's front office.

Testing or Positioning of Machines or Equipment

The following procedure must be used where lockout/tagout devices must be temporarily removed from the energy isolation devices so that the equipment or machine may be energized for testing or positioning.

1. Check the machine or equipment and the immediate area around the machine to ensure that non-essential (tools, rags, other equipment) items have been removed and that the machine or equipment components are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout/tagout devices and reenergize the machine or equipment for testing or positioning.
5. When testing or positioning is complete, deenergize machine or equipment and reapply control measures

Restoring Equipment to Service

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps must be taken by the authorized employee who applied the lockout/tagout device. If that employee is not available and the lockout/tagout device must be removed, follow the procedure outline in Alternate Procedure for Lockout/Tagout Device Removal.

1. 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.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.

Remove the lockout/tagout devices.

Re-energize the machine or equipment. Only the employee performing the initial lockout/tagout procedure has the authority to re-energize any machine or equipment. If this employee is unavailable, their immediate supervisor will then have the authority to re-energize the machine or equipment.

Note: The removal of some forms of blocking may require reenergization of the machine before safe removal.

Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

Alternate Procedure for Lockout/Tagout Device Removal

Only the authorized employee who applied the devices must remove lockout/tagout devices. However, when that employee is not available and the device must be removed, the following procedure must be used.

1. A supervisor must verify that the employee has left the University.
2. The employee's immediate supervisor may remove the lockout/tagout device through the use of bolt cutters or some other measure.
3. All reasonable efforts must be made to contact the employee and inform him/her that the lockout/tagout device has been removed.
4. The supervisor must ensure that the employee has been informed that his/her lockout/tagout device has been removed before he/she resumes work.

Procedure for Group Lockout/Tagout

When servicing and/or maintenance is performed by more than one person, the following procedure must be used. This procedure has been designed to provide an equivalent level of protection as that provided by individual lockout/tagout devices.

1. One authorized employee must be designated as responsible for a set number of employees working under the protection of a group lockout/tagout device.
2. Each employee in the group must review the lockout/tagout procedure to be used.
3. If more than one crew, craft, etc., is involved, one authorized employee must coordinate the lockout/tagout to ensure that all control methods are applied and that there is continuity of protection for the group.
4. Each authorized employee must affix a personal lockout/tagout device to the group lockout device, group lockbox, or comparable device before beginning work, and must remove it upon completion of their work.

Procedure for Shift or Personnel Changes

This procedure must be used during shift or personnel changes to ensure the continuity of lockout/tagout protection, for individual and group lockout/tagout.

1. The on-coming authorized employee must exchange lockout/tagout devices with the off-going authorized employee.
2. Re-testing must be done to ensure the de-energized state of the equipment.
3. Employees must discuss the status of maintenance or servicing and any notification of start-up or testing to be performed.

Annual Program Review

Each year an authorized employee, who is not involved in the procedure being inspected, must conduct an inspection of the lockout/tagout procedure. The inspection procedure must include the following elements.

1. Where lockout is used, a discussion of the authorized employee's responsibility under the lockout/tagout program with the inspector.
2. Where tagout is used, a discussion of the authorized employee's responsibility under the lockout/tagout program and the limitations of the tagout system with the inspector.
3. If deficiencies are noted during the inspection, corrective actions and retraining of employees, as necessary, must be done immediately.

Definitions

"Affected employee." An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

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

"Capable of being locked out." An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

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

"Energy isolating device." A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker, a disconnect switch, a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

"Energy source." Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

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

"Lockout." The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

"Lockout device." A device that utilizes a positive means such as a lock, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

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

"Qualified person." An employee who has training in avoiding the electrical hazards of working on or near exposed energized circuits.

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

"Setting up." Any work performed to prepare a machine or equipment to perform its normal production operation.

"Tagout." The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

"Tagout device." A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

This Program will be reviewed at least annually and updated when deemed necessary.

Appendix A

Specific Lockout Procedure for:

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(Identification of machine or equipment)

Authorized employees must perform lockout/tagout in accordance with this procedure for this particular machine or equipment and must initial each step as completed. Affected employees, upon observing a machine or piece of equipment that is locked or tagged out, to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment.

Sequence of Lockout

- (1) _____ Notify all affected employees that servicing or maintenance is required on this machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

| Names/Job Titles | How to Notify |
|------------------|---------------|
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- (2) _____ The authorized employee shall 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.

| Energy Type & Magnitude | Hazard | Method to Control Energy |
|-------------------------|--------|--------------------------|
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| | | |
| | | |
| | | |
| | | |

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

| Type of Operating Control | Location |
|---------------------------|----------|
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| | |

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

| Energy Isolation Device Type | Location |
|------------------------------|----------|
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(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.

| Types of Stored Energy | Method to Dissipate or Restrain |
|------------------------|---------------------------------|
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(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.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

Note: A qualified person must verify through the use of test equipment that all electrical circuit parts to which employees could be exposed during service or maintenance are de-energized. This test must also determine if any energized condition exist due to inadvertently induced voltage or unrelated voltage feedback even in circuits that have been deenergized and presumed safe. If the circuit to be tested is over 600 volts, the test equipment must be checked for proper operation before and immediately after the test.

(7) _____ The machine or equipment is now locked out.

(9) _____ The lockout/tagout device was temporarily removed for testing or positioning according to required procedures.

(10)_____ The machine or equipment has been restored to service according to required procedures.

(11)Supervisor sign off: _____

Note: Supervisors to keep on file and provide a copy to Safety Manager, Facilities Management.