

Protocol #05

Hazardous Energy Control  
Program  
(Lockout/Tagout)

DGS Accident and Illness  
Prevention Program (AIPP)

## **A. Policy Statement**

The following Hazardous Energy Control Program, including Lockout and Tagout (LOTO) requirements, is official policy for the PA Department of General Services (DGS) and its employees.

This policy includes material that applies directly to DGS operations. The in-depth treatment of this subject is Occupational Safety and Health Administration (OSHA) [CFR 29 1910.147](#) and its associated letters of interpretation which have been used for guidance. DGS High Voltage Electricians, however, have separate requirements based upon OSHA [CFR 29 1910 Subpart S](#) and other sources as outlined in other DGS protocols.

## **B. Scope, Application and Purpose**

This protocol covers the servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machines or equipment, or release of stored energy could cause injury to employees; and establishes minimum performance requirements for the control of such hazardous energy. Contractors shall adhere to OSHA requirements and communicate with DGS employees accordingly.

This protocol applies to the control of energy during servicing and/or maintenance of machines and equipment. However, if in any instance it conflicts with more stringent requirements, such as manufacturers' instructions or requirements currently imposed upon DGS' High Voltage Electricians, then those or any similar more stringent requirements shall be observed.

Normal production operations are not usually covered by this standard (see DGS [Protocol P-01, Electrical and Machine Safeguarding](#)). Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if: (1) An employee is required to remove or bypass a guard or other safety device; or (2) An employee is required to place any part of their body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

This protocol does not apply to work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start-up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

This protocol does not apply to hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that it is demonstrated that: (1) continuity of service is essential; (2) shutdown of the system is impractical; and (3) documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

With this protocol, DGS has established a program to prevent employees from being injured due to the unexpected energization, start-up, or release of stored energy while working on machinery or equipment. This purpose is accomplished by affixing appropriate lockout and/or tagout devices to energy isolating devices, and/or by otherwise disabling machines or equipment.

## **C. Definitions**

**Affected employee** – An employee whose job requires them 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 in this protocol.

**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 appurtenances. 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, either key or combination type, to hold an energy isolating device in a 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.

**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 adjusting or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

**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.

## **D. General**

**Energy control program:** Management shall establish a program consisting of energy control procedures, employee training, and periodic inspections to ensure before any employee performs servicing or maintenance on a machine or equipment where the unexpected energizing, startup, or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

**LOTO:**

1. If an energy isolating device is capable of being locked out, the energy control program shall utilize lockout equipment, unless management can demonstrate that the utilization of a tagout system will provide full employee protection.
2. Whenever replacement or major repair, renovation, or modification of a machine or piece of equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machines or equipment shall be designed to accept a lockout device.

**Energy control procedure:**

1. Procedures shall be developed, documented, and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section. **Exception** – Management need not document the required procedure for a particular machine or equipment when any of the following elements exist:
  - a. The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown which could endanger employees.
  - b. The machine or equipment has a single energy source which can be readily identified and isolated.
  - c. The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment.
  - d. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
  - e. A single lockout device will achieve a locked-out condition.
  - f. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
  - g. The servicing or maintenance does not create hazards for other employees.
  - h. No incident involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance have occurred previously.
2. The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance. Appendix A can be utilized as a template for documented LOTO procedures. Documented LOTO should include the following:
  - a. A specific statement of the intended use of the procedure.

- b. Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy.
- c. Specific procedural steps for the placement, removal, and transfer of lockout devices or tagout devices and the responsibility for them.
- d. Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

**Protective materials and hardware:**

1. Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by management for isolating, securing, or blocking of machines or equipment from energy sources.
2. LOTO devices shall be singularly identified, shall be the only device(s) used for controlling energy, shall not be used for other purposes, and shall meet the following requirements:
  - a. Durable
    - i. Capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected;
    - ii. Constructed and/or printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on it to become illegible;
    - iii. Not subject to damage if used in corrosive environments such as areas where corrosive chemicals are handled and stored.
  - b. Standardized
    - i. Lockout and tagout devices shall be standardized within each trade in at least one of the following criteria: color, shape, or size, and
    - ii. Tagout devices shall be standardized in their print and format.
  - c. Substantial
    - i. Lockout devices shall be substantial enough to prevent unauthorized removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.
    - ii. Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or incidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

- d. Identifiable
  - i. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).
3. Warning notices on tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: *Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate.*

**Periodic Inspection:**

1. Supervisors should conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.
  - a. The periodic inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.
  - b. The periodic inspection shall be conducted to correct any deviations or inadequacies identified.
  - c. Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.
2. Management shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

**Training and Communication:**

1. Supervisors shall provide training to ensure the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:
  - a. Each authorized employee shall receive training in the 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.
  - b. Each affected employee shall be instructed in the purpose and use of the energy control procedure.

- c. All other employees 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 machines or equipment which are locked out or tagged out.
2. When tagout systems are used, employees shall also be trained in the following limitations of tags:
  - a. Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.
  - b. When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.
  - c. To be effective, tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area.
  - d. Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
  - e. Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
  - f. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.
3. Employee retraining:
  - a. Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.
  - b. Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever the supervisor has reason to believe, there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.
  - c. The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.
4. Supervisors shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.



## **E. Application of Control**

The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

**Preparation for shutdown:** Before an authorized turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

**Machine or equipment shutdown:** The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

**Machine or equipment isolation:** All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

**Notification of Employees:** Affected employees shall be notified by the supervisor or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

### **Lockout or tagout device application:**

1. Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.
2. Lockout devices, where used, shall be affixed in a manner that will hold the energy isolating devices in a “safe” or “off” position.
3. Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the “safe” or “off” position is prohibited.
  - a. Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.
  - b. Where a tag cannot be affixed directly to the energy isolating device, it shall be located as close as safely possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.

**Stored energy:**

1. Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.
2. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

**Verification of isolation:** Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify isolation and de-energization of the machine or equipment have been accomplished.

## **F. Release from Lockout or Tagout**

**Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed, and actions taken by the authorized employee(s) to ensure the following:**

**The machine or equipment:** The work area shall be inspected to ensure nonessential items have been removed and machine or equipment components are operationally intact.

**Employees:**

1. The work area shall be checked to ensure all employees have been safely positioned or removed.
2. After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified the lockout or tagout device(s) have been removed.

**Lockout or tagout devices removal:** Each lockout or tagout device shall be removed from each energy isolating device by the authorized employee who applied the device, except that if the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of management, provided specific procedures and training for such removal have been developed, documented, and incorporated into the energy control program. Appendix B can be utilized to document emergency lockout or tagout device removal when the employee who initiated the lockout is not available. The specific procedure shall include at least the following elements:

1. Verification by management that the authorized employee who applied the device is not at the facility.

2. Making all reasonable efforts to contact the authorized employee to inform them that their lockout or tagout device has been removed.
3. Ensuring that the authorized employee has this knowledge before they resume work at that facility.

## **G. Additional Requirements**

**Testing or positioning of machines, equipment, or components thereof:** In situations where lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment, or component thereof, the following sequence of actions shall be followed:

1. Clear the machine or equipment of tools and materials by inspecting to ensure nonessential items have been removed and to ensure machine or equipment components are operationally intact.
2. Remove employees from the machine or equipment area as described above in section **F. Employees**.
3. Remove the lockout or tagout devices as specified above in section **F. Lockout or tagout devices removal**.
4. Energize and proceed with testing or positioning.
5. Deenergize all systems and reapply energy control measures in accordance with sections **E.** and **F.** of this protocol to continue the servicing and/or maintenance.

### **Outside personnel (contractors, etc.)**

1. Whenever outside servicing personnel hired by DGS are to be engaged in activities covered by the scope and application of this standard, management and the outside employer shall inform each other of their respective LOTO procedures.
2. Management shall ensure Commonwealth employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

### **Group lockout or tagout**

1. When servicing and/or maintenance is performed by a crew, craft, department, or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.
2. Group lockout or tagout devices shall be used in accordance with the procedures outlined under **Energy control procedure** within section **D.** of this protocol, including but not limited to the following specific requirements:

- a. Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device.
- b. Provision for the authorized employee to determine the exposure of individual group members with regard to the lockout or tagout of the machine or equipment.
- c. When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection.
- d. Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when they begin work, and shall remove those devices when they stop working on the machine or equipment being serviced or maintained.

**Shift or personnel changes:** Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

## **H. Recordkeeping**

**The periodic inspections and training records shall be kept on file by the managers or supervisors in charge of lockout/tagout procedures. A copy of the training sign-in sheets shall be provided to the DGS Safety Coordinator.**



**Appendix A – Equipment/Machine Specific Lockout/Tagout (LOTO) Procedure**

<b>Equipment/Machine Name:</b>		<b>Location:</b>		
<b>Address:</b>				
<b>Assessed By:</b>		<b>Date Revised:</b>		
<b>Approved By:</b>		<b>Date Issued:</b>		
<b>Notes:</b>				
<b>LOTO Steps</b>				
<b>1. Notify affected employees that a LOTO is in process.</b>				
<b>2. If the equipment/machine is running, shutdown using the standard operating procedures.</b>				
<b>3. Isolate the equipment/machine from its energy sources in the following sequence:</b>				
<b>Type</b>	<b>Location</b>	<b>Method</b>	<b>Device</b>	<b>Check</b>
				Attempt to start equipment/machine, ensure it does not start.
<b>Caution! After verification, return the operating controls to the neutral or OFF position.</b>				
<b>You may now proceed with your work</b>				
<b>Restoring to Service</b>				
<b>1. Clear all tools and parts from inside and around the equipment/machine.</b>				
<b>2. Replace any guards that may have been removed.</b>				
<b>3. Make sure all employees are at a safe distance from the equipment/machine.</b>				
<b>4. Make sure normal operating controls are still in the “neutral” or “off” position.</b>				
<b>5. Remove all energy isolation devices from the equipment/machine and restore power.</b>				
<b>6. Notify affected employees LOTO is complete and the equipment/machine is ready for use.</b>				

## **Appendix B – Lockout/Tagout (LOTO) Emergency Removal**

In the event of an emergency, a LOTO device may need to be removed by someone other than the person who applied the LOTO device. In these rare but possible situations the following procedures shall be followed:

1. All reasonable efforts shall be made to contact the person who applied the LOTO device to personally remove it.
2. The second page of this document shall be completed by the supervisor authorizing the removal of the LOTO device. The authorizing supervisor shall provide the completed form to the DGS Safety Coordinator or employee within the Fire, Safety and Environmental Division and the supervisor of the person who applied the original LOTO device as soon as possible, preferable before the LOTO device is removed, but no later than 48 hours after the device removal.

### **Emergency LOTO Device Removal Procedures**

1. Check the area around the entire machine and/or equipment to ensure no one is exposed and no other hazards exist or will exist when the power is restored.
2. Notify all affected employees of the situation.
3. Ensure all guards have been reinstalled and all tools are out of the machine and/or equipment.
4. Confirm that normal “stop-safes” and/or “e-stops” are engaged.
5. Remove the LOTO device(s).
6. Restore power.
7. Disengage “stop-safes/e-stops” and proceed to check the machine and/or equipment.
8. Return the machine and/or equipment to normal operation if conditions warrant.



**Appendix B – Lockout/Tagout (LOTO) Emergency Removal**  
**(continued)**

***Emergency LOTO Device Removal (Authorized Person)***

**Building:** \_\_\_\_\_

**Name and location of equipment locked out and tagged:** \_\_\_\_\_  
\_\_\_\_\_

**Location of circuit breaker of lockout device:** \_\_\_\_\_

**Authorizing supervisor's name:** \_\_\_\_\_

**Name of employee who applied the LOTO device:** \_\_\_\_\_

**Authorized person's name who removed the LOTO device:**  
\_\_\_\_\_

**Date and time of removal:** \_\_\_\_\_