



Why do I Need Lockout/Tagout?

The Importance of Implementing an Effective Lockout/Tagout Program

Introduction

Every year, workers are unnecessarily exposed to hazardous energy sources such as mechanical, hydraulic, pneumatic, chemical, thermal, gravity or other energies utilized by machines in manufacturing, during servicing, maintenance, or setting up equipment. Accidental start-up of machinery or unintended release of stored energy often presents catastrophic risks including but not limited to crush, amputation, shock, and burn injuries as well as equipment damage. This exposure can cause serious physical injuries or death to workers unaware that someone else has started a machine or energized a circuit. Many of the injuries result in some level of permanent disability of the employee.

Employee injuries, whether catastrophic, serious, or minor, negatively impact your business. Risks including loss of valuable employees, damage to equipment, production interruption, regulatory inspection, and potential damage to your business reputation due to such events, can all be reduced by implementing proper Lockout/Tagout (LOTO) procedures to control hazardous energy. Ten percent of all serious workplace injuries are attributed to failure to have an effective LOTO program.¹

The purpose of this technology brief is to describe the importance of LOTO, the elements of an effective LOTO program and the implementation of a LOTO program.

Importance of Lockout/Tagout

LOTO is a process to control energy hazards for preventing accidental start-up or release of stored energy during set-up, maintenance and servicing of equipment. LOTO prevents an estimated 120 fatalities and 50,000 injuries each year.²

OSHA outlines the LOTO safety method in standard 29 CFR 1910.147 "Control of Hazardous Energy". LOTO is a widely accepted practice for US companies, and OSHA advises that "Workers servicing or maintaining machines or equipment may be seriously injured or killed if hazardous energy is not properly controlled. Injuries resulting from the failure to control hazardous energy during maintenance activities can be serious or fatal. Craft workers, electricians, machine operators, and laborers are among the three million workers who service equipment routinely and face the greatest risk of injury." According to OSHA, "Workers injured on the job from exposure to hazardous energy lose an average of 24 workdays for recuperation." Following are three examples of accidents due to a lack of LOTO practices:

¹ <https://www.osha.gov/SLTC/controlhazardousenergy/>

² https://www.osha.gov/OshDoc/data_General_Facts/factsheet-lockout-tagout.pdf



- A steam valve is automatically turned on burning workers who are repairing a downstream connection in the piping
- A jammed conveyor system suddenly releases, crushing a worker who is trying to clear the jam
- Internal wiring on a piece of factory equipment electrically shorts, shocking an employee who is repairing the equipment

(This information available at <https://www.osha.gov/SLTC/controlhazardousenergy/index.html>)

WHY?

Why do I need Lockout/Tagout?

- Protect workers
- Prevent accidental startup or release of hazardous energy

WHEN?

When hazards are present?

- Service
- Maintenance
- Repair
- Set-up
- Adjustment
- Modification
- Installation

WHAT?

What energy sources to lockout?

- Electrical
- Mechanical
- Pneumatic
- Hydraulic
- Thermal
- Chemical

Why? LOTO is essential for protection of employees performing work where hazardous energy may be present. Accidental start-up of machinery or unintended release of stored energy often present catastrophic risks including but not limited to crush, amputation, shock, and burn injuries as well as equipment damage. Many of the injuries result in some level of permanent disability of the employee.

When? It is necessary to control such energy every time an employee is servicing or repairing equipment, performing maintenance tasks, installing or modifying equipment, or performing equipment set-up or tooling changeovers.

What? Procedures must be developed, documented, and utilized for the control of potentially hazardous energy sources and must include specific steps for shutting down, isolating, blocking and securing machines or equipment to control these risks.

Control of Hazardous Energy Statistics

120 number of **fatalities** Lockout/Tagout prevents each year

50,000 number of **injuries** Lockout/Tagout prevents each year

10% percent of all serious injuries are attributed to **absence or failure** of a Lockout/Tagout program

24 number of **workdays** workers injured from exposure to hazardous energy lose for recuperation

Statistics shown based on data for the United States;
Source-
<http://www.osha.gov/SLTC/controlhazardousenergy/index.html>



Elements of an Effective Lockout/Tagout Program

There are five essential elements of an effective LOTO program:



1. Program - The LOTO program documentation sets the overall policy and expectations for LOTO at your company or location. It also defines how you will implement and execute all of the other essential elements within your program. An effective energy control program includes energy control procedures, employee training, and periodic inspections, which jointly function to ensure that hazardous energy sources are isolated and rendered safe before, and while any employee performs any servicing or maintenance on any machinery or piece of equipment. The LOTO standard does not require a written energy control program; however, the standard does have several requirements regarding documentation and certification of records. The procedures must clearly and specifically outline the scope, purpose, authorization, rules, and techniques that employees are to use to control hazardous energy and the means to enforce compliance³.

The program/policy should be written clearly so authorized employees can understand it. It should remain dynamic in order to change with conditions and regulations. It should be provided to the authorized employees and expected that they read and understand it, and it should address all aspects of the program to ensure they know how to lock out the equipment and when to lock out the equipment⁴.

2. Procedures - LOTO procedures are required for “complex” instances where there are multiple energy sources and/or multiple crews, locations, employers, or specific sequences. In many cases, individual procedures are also needed for equipment with a single energy source. The procedures must be specific to each piece of equipment or type of equipment, providing adequate detail as to how and where to specifically isolate and control all of the energy sources present for that particular equipment. The LOTO procedures should contain instructions including:



Figure 1. Pneumatic Energy Lockout Device.

- De-energize Equipment - where and how to de-energize the energy load on the equipment
- Stored Energy – how to release hazardous electrical, mechanical, or other stored energy (for example discharged capacitors, springs unloaded, pneumatic/hydraulic pressure released, etc.)
- Verification – how to verify the equipment is de-energized and cannot restart in the locked out condition

³ Source: <http://1.usa.gov/Y5r1VF>

⁴ Source: <http://ehstoday.com/basics-of-lockout>



3. Training – Proper training is a necessary component of any LOTO program. It helps you provide the information and equipment your team needs to begin implementing an effective LOTO program. Training is needed for two types of employees:



Authorized Employees - employees such as maintenance personnel who execute LOTO processes. These employees must be trained to demonstrate competence to execute the specific LOTO procedures they are expected to utilize.

Affected Employees - employees such as machine operators or office personnel who may encounter equipment that has been locked out. These employees should receive awareness training (definitions, responsibilities, general procedures, device requirements, and shut down procedures) on the company's lockout program.

4. Devices - Protective devices should be robust, unique, and easily identifiable (see Figure 2). Other requirements involve a method of including a lock and identification of the lockout device installer. Additional requirements include:

- Padlock Security – the key remains with the individual who installed the device. The padlock may be removed by a supervisor ONLY after all means to contact the employee who installed the device are exhausted. When the employee returns, the supervisor immediately informs the employee the safety device was removed
- Identification Method – establish a method of identifying the individual who installed the device, (e.g., a lockout tag)
- Energizing Prevention – prevents energizing of the equipment locked out without the use of excessive force
- Tag Security – tag is secured with a nylon cable tie rated to 50 lbs. (224.4N) or equivalent
- Tag Statement – tag should include a statement prohibiting energizing the equipment locked out, (e.g., "DANGER – EQUIPMENT LOCKED OUT")



Figure 2. Cord lockout device.



5. Review - The final element, program inspection and review, must outline a methodology for ensuring the program remains effective for employee protection. This must include at least an annual review of the overall program documentation as well as a review of the equipment-specific procedure documents and observations of execution of those equipment-specific LOTO processes.

Implementation of a Lockout/Tagout Program

To successfully implement a LOTO program, it is important to understand how to perform the implementation, using the five elements discussed earlier. To support in this implementation, Panduit offers a safety solution to our customers consisting of relevant products and tools that help mitigate risk created by hazards in the



workplace. You can help your company protect employees and infrastructures from the hazards created by energized equipment and systems by working with Panduit as your single-source provider of safety solutions.

Program

To create the LOTO program documentation, several areas need to be addressed. These topics include, but are not limited to the following:

- Purpose and Scope
- Rules
- Lockout Procedures and Techniques
- Removal of Lockout Devices
- Training
- Tagout Procedures

Panduit has a template and sample LOTO program document available as part of the LOTO training kit, part number **PSL-LOTO-TRAIN**.

Procedures

The equipment specific LOTO procedures explain the following steps:

1. Provide verbal notification of LOTO to affected employees
1. Shut down machine and/or equipment using standard stopping instructions
2. Refer to picture and steps to isolate all energy sources
3. Apply devices for each energy source
4. Release all residual and stored energy
5. Verify all sources have been de-energized

A sample of a LOTO procedure is shown in Figure 1. When equipment design does not allow for securing with a lockout device, a tagout operation may be utilized where a tag is secured to each energy source, clearly communicating the LOTO condition. In a tagout condition, an additional preventative measure is employed such as removing a fuse.

Figure 3. Machine Specific LOTO Instructions.



Training

Training for both authorized and affected employees is required for an effective LOTO program. Answer the following questions to ensure your company has an effective LOTO training in place:

- Have all **authorized** employees received training in the recognition of applicable energy sources, the types and magnitude of energies available in the workplace, and the methods of energy isolation and control?
- Have all **affected** and other employees been advised of LOTO procedures and instructed not to attempt to start or energize locked or tagged out machines or circuits?
- Have all employees been instructed on the use and limitations of tags?
- Is training on LOTO provided for initial job assignment, during a change in job assignments, machines, or processes, or as needed?
- Is worker training certified and logged with names and dates of training?

Panduit has tools to help your company provide LOTO training:

Life is on the Line Video – This 15 minute video provides the necessary information for training affected and other employees. This free video is available [online](#) as well as on DVD as part of the kit: **PSL-LOTO-TRAIN**.

Lockout/Tagout Compliance Training Kit – This kit (part number **PSL-LOTO-TRAIN**) takes you step-by-step through the process of establishing a LOTO program at your company. This complete package includes:

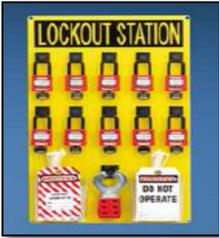
- **Training Video:** DVD video “Life is on the Line” for training employees on the elements and application of LOTO
- **Compliance CD:** Contains training agenda, quiz, certificate, key points for hands on device training, templates, step-by-step interactive presentation, facility and machine specific procedure templates, training and inspection logs; LOTO program template, periodic and LOTO checklists.
- **Hands-On Samples:** Demonstration components for thorough “hands-on” training including circuit breakers, ball valves, electrical plugs, and the compatible Panduit lockout devices.

Devices

LOTO devices include several key parts that are necessary to implement a LOTO program. Not only are products needed to build your LOTO program, the products utilized must be robust and easily identifiable as lockout devices. To implement a program at your company, Panduit offers a complete solution of LOTO equipment and devices (shown below in two device categories: Program Equipment and Energy Isolation) that meet these requirements.



Program Equipment

	<p>Padlocks</p> <p>Secure locked out equipment with safety padlocks like the PSL-8 shown here. This padlock can be ordered in different colors and keying combinations to match your lockout program needs.</p>
	<p>Group Lockout</p> <p>When more than one employee is involved in a lockout operation, ensure power sources and machines are shut down completely. Panduit offers two methods of applying multiple locks: a group lock box such as the PSL-GLBN shown here or hasps such as the PSL-1.5A.</p>
	<p>Tags</p> <p>Prevent accidental or unexpected ignition of equipment. Preprinted tags or customizable tags like the PVT-98 shown here can be secured to equipment using a padlock or a cable tie.</p>
	<p>Stations</p> <p>Conveniently store padlocks, tags and lockout devices in one common area using a station such as the PSL-10SWCA shown here.</p>

Energy Isolation

	<p>Circuit Breaker Lockout</p> <p>Full line of devices to lockout miniature, standard and large circuit breakers like the PSL-PCBNT for standard circuit breakers shown here.</p>
	<p>Switch Lockout</p> <p>Prevent accidental start up. For use on light switches Panduit offers the PSL-WS (shown).</p>



	<p>Plug Lockout Lockout small or large electrical plugs with devices like the PSL-P shown here.</p>
	<p>Gate Valve Lockout Prevent access and cover a valve handle to keep a valve turned off. Devices available to lockout gate valves from 1" up to 13", the PSL-V2A shown here on a 2" handle.</p>
	<p>Multiple Lockout Lock out a broad range of equipment with a versatile PSL-MLD which utilizes a wire rope to lock out equipment, disconnects, valves, and more.</p>
	<p>Ball Valve Lockout Lock out almost any type of valve and a variety of pneumatic hoses. Devices available in 4 sizes to lockout ball valves from 0.25" up to 8" pipe diameters, the PSL-BV1 shown here on a 3/4" pipe valve.</p>

For a complete list of equipment and devices, you can view the complete [Panduit safety catalog](#).

Review

Program inspection and review must outline a methodology for ensuring the program remains effective for employee protection. Points to be included for your company's program review:

- Energy control procedures reviewed at least annually
- Annual inspection should include an assessment of the adequacy of the procedure
- Review conducted by an authorized employee other than the one utilizing the procedure
- Inspection accurately identifies and corrects deviations or inadequacies
- The employer should certify that periodic inspections have been performed
- Certification should include the equipment, the date of the inspection, the employees included and the person conducting the inspection

Panduit has a program inspection form available as part of the LOTO training kit, part number: **PSL-LOTO-TRAIN**.



Referenced Resources

- **OSHA CFR 29 1910.147**, The Control of Hazardous Energy

How Can Panduit Help?

Panduit understands workplace safety regulations and offers complete safety solutions with high quality, reliable products and tools you can count on to keep your employees, workplace and jobsites safe. Whether you're implementing a new program or trying to maintain and stay current with the latest industry regulations, trust Panduit to be there for you with the ongoing support you need. Stay safe with Panduit. For further information, please visit www.panduit.com/safety.