

LOCKOUT/TAGOUT (LOTO) **(CONTROL OF HAZARDOUS ENERGY)**

The control of hazardous energy is an essential life and limb saving step that must be followed by businesses and employees who perform work on and maintain industrial equipment or systems that present a hazard if contacted. The Occupational Safety and Health Administration (OSHA) has developed standards for the recognition of hazardous energy sources and procedures to control the release of those energies to protect workers. Hazardous energy sources and examples include:

- **Electrical:** AC/DC, generator, battery
- **Mechanical:** coiled springs, raised loads, moving parts
- **Pneumatic:** pressurized gas, compressed air
- **Hydraulic:** water, oil, liquids
- **Thermal:** steam, hot, cold
- **Chemical:** acids, corrosives, caustics
- **Kinetic and potential energy**

Standards for the control of hazardous energy in general industry, enforced by OSHA can be found in [29 CFR 1910.147](#). These standards are designed to control hazardous energy source(s) when workers perform maintenance or service activities on machines or equipment using locks, tags, and other control techniques. Procedures developed in compliance with this standard will ensure that employees who are working on equipment and machines are not injured because of accidental startup or release of stored energy of the equipment while they are working on or in it.

The standard discusses the difference between maintenance/servicing and minor adjustments of

machinery. A minor adjustment is one that takes place during normal production operations, is

routine, repetitive, and integral to the use of the equipment for production. LOTO is not required during minor adjustments of equipment; these activities are covered under the general industry [Machinery and Machine Guarding](#) standards.

For electrical energy sources, the standard does not apply to equipment that is powered with only and plug and cord as long as the employee has access to and control of the plug while work is being performed. Other forms of hazardous energy (e.g. pneumatic) on cord and plug machines must be controlled during maintenance and servicing.

In order to comply with the standard and implement an energy control program, we recommend that you conduct a survey of your facilities and operations to determine which machines and equipment your employees normally service and/or maintain that may have some form of stored energy during those activities. Identify each piece of equipment by name, serial or equipment number, etc. Once equipment has been identified, energy control procedures must be developed. Procedures should list the forms of energy sources and provide a short description of how each source should be controlled. You may deem it necessary to divide your workforce into two groups – affected employees and authorized employees. An affected employee is one whose job requires him or 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 or her to work in an area in which

**Hazardous
energy is any
type of energy in
sufficient
quantity to
cause injury to a
worker**

such servicing or maintenance is being performed. An authorized employee is one who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. The standard requires awareness

As an example, you may have a machine that is powered by electricity and also has moving parts that are powered by hydraulic pressure. Before an authorized employee can perform maintenance on this machine, he or she must locate the electrical disconnect (it may be a knife switch on a disconnect near the machine or the circuit breaker for the machine). This electrical disconnect must be turned off and locked out with a lock and tag that can only be removed by the authorized employee. Next, he or she has to locate the source of hydraulic pressure and ensure that it does not cause the machine to activate while the authorized employee works on the machine. To accomplish this, it may be necessary to close and lock a valve or disconnect a hydraulic line. If these are the only sources of hazardous energy, the employee should test the equipment to ensure all residual energy is dissipated. Once verified, the authorized employee can proceed with the work.

The standard requires that locks be utilized whenever possible. Locks should always be accompanied by a tag that identifies the authorized person. A tags-only system can be used under special circumstances as described in paragraph (c)(3) of the standard. These systems require additional protection measures called “tags plus” to ensure full employee protection including removal valve handles or blocking the control switch in addition to applying tagout. If machines do not have electrical devices that are designed to accept a lock, the standard requires that any major repair, renovation or modification

Each affected employee shall be instructed in the purpose and use of the energy control procedure

training for affected employees and more rigorous training for authorized employees. Dividing your employees in this manner will ensure that each receives adequate training

made to such a machine include changes to provide a provision for a lock.

OSHA’s standard, combined with your hazardous energy control program and procedures, describe specific sequential steps that must be taken to ensure that all affected employees (including operators) know how to identify a machine that is locked out for maintenance. Affected employees must recognize when a machine is shut down for maintenance and that locks and tags are never to be removed by them. Authorized employees must use equipment-specific lockout/tagout procedures that identify the energy sources and sequential shut down, lockout, and verification steps prior to working on the equipment.

Paragraphs (d) and (e) of the standard list the general steps needed to perform lockout/tagout adequately. This step-by-step approach is important so that everyone who is associated with the machine knows that it is being maintained and one or more employees may be subjected to a hazardous release of energy if they were to try to operate the machine. The steps also describe how the locks and other controls are to be removed and affected employees notified so that when the machine is put back into service, no employee is in a position where they could be harmed.

If you have contractors or other outside personnel who perform maintenance activities in your facility on equipment or machines covered by the LOTO standard each party must inform each other of their respective LOTO programs. Affected employees should be made aware of the

contractor's program and sequence of expected events.

The lockout/tagout standard addresses a variety of issues surround the application and removal of locks and tags- including the stipulations for removing a lock when the authorized employee who applied it is not present. Additionally, there are requirements for multiple employees performing maintenance activities, shift and personnel changes and preparing equipment for reenergization. For additional information or questions regarding the control of hazardous energy sources at your workplace, please don't hesitate to utilize our ["Ask the Expert"](#) Feature.

Other useful resources include:

[OSHA Safety and Health Topics on Control of Hazardous Energy](#)
[National Institute for Occupational Safety and Health \(NIOSH\)](#)