Lockout/Tagout

Purpose
The standard identifies the practices and procedures necessary to shut down and lock out or tag out machines and equipment, requires that employees receive training in their role in the lockout/tagout program, and mandates that periodic inspections be conducted to maintain or enhance the energy control program. The use of lockout devices will provide a more secure and more effective means of protecting employees from the unexpected release of hazardous energy or startup of machines and equipment.

Scope & Application
The lockout/tagout standard applies to general industry employment and covers the servicing and maintenance of machines and equipment in which the unexpected startup or the release of stored energy could cause injury to employees. (If employees are performing servicing or maintenance tasks that do not expose them to the unexpected release of hazardous energy, the standard does not apply.)

The standard establishes minimum performance requirements for the control of hazardous energy. The standard does not apply in the following situations:

- While servicing or maintaining cord and plug connected electrical equipment. (The hazards must be controlled by unplugging the equipment from the energy source; the plug must be under the exclusive control of the employee performing the servicing and/or maintenance.)
- During hot tap operations that involve transmission and distribution systems for gas, steam, water or petroleum products when they are performed on pressurized pipelines; when continuity of service is essential, and shutdown of the system is impractical; and employees are provided with an alternative type of protection that is equally effective.

Normal Production Operations
OSHA recognizes that machines and equipment present many hazardous situations during normal production operations – i.e., whenever machines and equipment are used to perform their usual production function. These production hazards are covered by rules in other General Industry Standards, such as the requirements in Subpart O of Part 1910 for general machine guarding and guarding power transmission apparatus (1910.212 and 1910.219). In certain circumstances, however, some hazards encountered during normal production operations may be covered by the lockout/tagout rule. The following paragraphs illustrate some of these instances.

Servicing and/or Maintenance Operations
If a servicing activity – such as lubricating, cleaning, or un-jamming the production equipment – takes place during production, the employee performing the servicing may be subjected to hazards that are not encountered as part of the production operation itself. Workers engaged in these operations are covered by lockout/tagout when any of the following conditions occur:

- The employee must either remove or bypass machine guards or other safety devices, resulting in exposure to hazards at the point of operation;
- The employee is required to place any part of his or her body in contact with the point of operation of the operational machine or piece of equipment; or
- The employee is required to place any part of his or her body into a danger zone associated with a machine operating cycle.
In the above situations, the equipment must be de-energized and locks or tags must be applied to the energy-isolation devices.

In addition, when normal servicing tasks – such as setting up equipment, and/or making significant adjustments to machines – do not occur during normal production operations, employees performing such tasks are required to lock out or tag out if they can be injured by unexpected energization of the equipment.

OSHA also recognizes that some servicing operations must be performed with the power on. Making many types of fine adjustments, such as centering the belt on conveyors, is one example. Certain aspects of troubleshooting, such as identifying the source of the problem as well as checking to ensure that it has been corrected, is another. OSHA requires the employer to provide effective protection for employees performing such operations. Although, in these cases, a power-on condition is essential either to accomplish the particular type of servicing or to verify that it was performed properly, lockout or tagout procedures are required when servicing or maintenance occurs with the power off.

**Minor Servicing Tasks**

Employees performing minor tool changes and adjustments and/or other minor servicing activities during normal production operations that are routine, repetitive and integral to the use of the production equipment are not covered by the lockout/tagout standard, provided the work is performed using alternative measures that give effective protection.

**Provisions of the Standard**

The standard requires employers to establish procedures for isolating machines or equipment from the input of energy and affixing appropriate locks or tags to energy-isolating devices to prevent any unexpected energization, startup or release of stored energy that would injure workers. When tags are used on energy-isolating devices capable of being locked out, the employer must provide additional means to assure a level of protection equivalent to that of locks. The standard also requires the training of employees, and periodic inspections of the procedures to maintain or improve their effectiveness.

**Energy Control Program**

The lockout/tagout rule requires that the employer establish an energy control program that includes (1) documented energy control procedures, (2) an employee-training program and (3) periodic inspections of the procedures. The standard requires employers to establish a program to ensure that machines and equipment are isolated and inoperative before any employee performs servicing or maintenance where the unexpected energization, startup or release of stored energy could occur and cause injury.

The purpose of the energy control program is to ensure that, whenever the possibility of unexpected machine or equipment startup exists or when the unexpected release of stored energy could occur and cause injury, the equipment is isolated from its energy source(s) and rendered inoperative prior to servicing or maintenance.

Employers have the flexibility to develop a program and procedures that meet the needs of their particular workplace and the particular types of machines and equipment being maintained or serviced.

**Energy Control Procedure**

This standard requires that energy control procedures be developed, documented and used to control potentially hazardous energy sources whenever workers perform activities covered by the standard.
The written procedures must identify the information that authorized employees must know in order to control hazardous energy during servicing or maintenance (see section on “Employee Training”). If this information is the same for various machines or equipment or if other means of logical grouping exist, then a single energy control procedure may be sufficient. If there are other conditions – such as multiple energy sources, different connecting means, or a particular sequence that must be followed to shut down the machine or equipment – then the employer must develop separate energy control procedures to protect employees.

The energy control procedure must outline the scope, purpose, authorization, rules and techniques that will be used to control hazardous energy sources as well as the means that will be used to ensure compliance. At a minimum it includes, but is not limited to, the following elements:

- a statement on how the procedure will be used;
- the procedural steps needed to shut down, isolate, block and secure machines or equipment;
- the steps designating the safe placement, removal and transfer of lockout/tagout devices and who has the responsibility for them; and
- the specific requirements for testing machines or equipment to determine and verify the effectiveness of locks, tags and other energy control measures.

The procedure must include the following steps: (1) preparing for shutdown, (2) shutting down the machine(s) or equipment, (3) isolating the machine or equipment from the energy source(s), (4) applying the lockout or tagout device(s) to the energy-isolating device(s), (5) safely releasing all potentially hazardous stored or residual energy, and (6) verifying the isolation of the machine(s) or equipment prior to the start of servicing or maintenance work.

In addition, before lockout or tagout devices are removed and energy is restored to the machines or equipment, certain steps must be taken to reenergize equipment after servicing is completed, including: (1) assuring that machines or equipment components are operationally intact; (2) notifying affected employees that lockout or tagout devices have been removed, and ensure that all employees are safely positioned or removed from equipment; (3) assuring that lockout or tagout devices are removed from each energy-isolating device by the employee who applied the device. (See sections 6(e) and 6(f) of 29 CFR 1910.147 for specific requirements of the standard.)

**Energy-Isolating Devices**

The employer’s primary tool for providing protection under the standard is the energy-isolating device, which is the mechanism that prevents the transmission or release of energy and to which all locks or tags are attached. This device guards against accidental machine or equipment startup or the unexpected re-energization of equipment during servicing or maintenance. There are two types of energy-isolating devices: those capable of being locked and those that are not. The standard differentiates between the existence of these two conditions and the employer and employee responsibilities in each case.

When the energy-isolating device cannot be locked out, the employer must use tagout. Of course, the employer may choose to modify or replace the device to make it capable of being locked. When using tagout, the employer must comply with all tagout-related provisions of the standard and, in addition to the normal training required for all employees, must train his or her employees in the following limitations of tags:

- Tags are essentially warning devices affixed to energy-isolating devices and do not provide the physical restraint of a lock.
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- When a tag is attached to an isolating means, it is not to be removed except by the person who applied it, and it is never to be bypassed, ignored or otherwise defeated.
- Tags must be legible and understandable by all employees.
- Tags and their means of attachment must be made of materials that will withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security. They are only one part of an overall energy control program.
- Tags must be securely attached to the energy-isolating devices so that they cannot be detached accidentally during use.

If the energy-isolating device is lockable, the employer shall use locks unless he or she can prove that the use of tags would provide protection at least as effective as locks and would assure “full employee protection.”

Full employee protection includes complying with all tagout-related provisions plus implementing additional safety measures that can provide the level of safety equivalent to that obtained by using lockout. This might include removing and isolating a circuit element, blocking a controlling switch, opening an extra disconnecting device, or removing a valve handle to reduce the potential for any inadvertent energization.

Although OSHA acknowledges the existence of energy-isolating devices that cannot be locked out, the standard clearly states that whenever major replacement, repair, renovation or modification of machines or equipment is performed and whenever new machines are installed, the employer must ensure that the energy-isolating devices for such machines or equipment are lockable. Such modifications and/or new purchases are most effectively and efficiently made as part of the normal equipment replacement cycle. All newly purchased equipment must be lockable.

Requirements for Lockout/Tagout Devices
When attached to an energy-isolating device, both lockout and tagout devices are tools that the employer can use in accordance with the requirements of the standard to help protect employees from hazardous energy. The lockout device provides protection by holding the energy-isolating device in the safe position, thus preventing the machine or equipment from becoming energized. The tagout device does so by identifying the energy-isolating device as a source of potential danger; it indicates that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed. Whichever devices are used, they must be singularly identified, must be the only devices used for controlling hazardous energy and must meet the following requirements:

- Durable - Lockout and tagout devices must withstand the environment to which they are exposed for the maximum duration of the expected exposure. Tagout devices must be constructed and printed so that they do not deteriorate or become illegible, especially when used in corrosive (acid and alkali chemicals) or wet environments.
- Standardized - Both lockout and tagout devices must be standardized according to either color, shape or size. Tagout devices must also be standardized according to print and format.
- Substantial - Lockout and tagout devices must be standardized enough to minimize early or accidental removal. Locks must be substantial to prevent removal except by excessive force of special tools such as bolt cutters or other metal cutting tools. Tag means of attachment must be non-reusable, attachable by hand, self-locking, and non-releasable, with a minimum unlocking strength of no less than 50 pounds.
- The device for attaching the tag also must have the general design and basic characteristics equivalent to a one-piece nylon cable tie that will withstand all environments and conditions.
• Identifiable - Locks and tags must clearly identify the employee who applies them. Tags must also warn against hazardous conditions if the machine or equipment is energized and must include a legend such as the following: DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.

**Employee Training**

The employer must provide effective initial training and retraining as necessary and must certify that such training has been given to all employees covered by the standard. The certification must contain each employee’s name and dates of training.

For the purposes of the standard, there are three types of employees – **authorized**, **affected** and **other**. The amount and kind of training that each employee receives is based upon (1) the relationship of that employee’s job to the machine or equipment being locked or tagged out, and (2) the degree of knowledge relevant to hazardous energy that he or she must possess.

For example, the employer’s training program for **authorized** employees (those who are charged with the responsibility for implementing the energy control procedures and performing the servicing or maintenance) must cover, at minimum, the following areas:

- details about the type and magnitude of the hazardous energy sources present in the workplace, and
- the methods and means necessary to isolate and control those energy sources (i.e., the elements of the energy control procedure(s)).

By contrast, **affected** employees (usually the machine operators or users) and all **other** employees need only be able to (1) recognize when the control procedure is being implemented, and (2) understand the purpose of the procedure and the importance of not attempting to start up or use the equipment that has been locked or tagged out.

Because an “affected” employee is not one who is performing the servicing or maintenance, that employee’s responsibilities under the energy control program are simple: Whenever there is a lockout or tagout device in place on an energy-isolating device, the affected employee leaves it alone and does not attempt to operate the equipment.

Every training program must ensure that all employees understand the purpose, function and restrictions of the energy control program and that **authorized** employees possess the knowledge and skills necessary for the safe application, use and removal of energy controls.

Training programs used for compliance with this standard, which is performance-oriented, should deal with the equipment, type(s) of energy, and hazard(s) specific to the workplace being covered.

Retraining must be provided, as required, whenever there is a change in job assignments, a change in machines, equipment or processes that present a new hazard or a change in energy control procedures. Additional retraining must be conducted whenever a periodic inspection reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in the employee’s knowledge or use of the energy control procedure.

**Periodic Inspections**

Periodic inspections must be performed at least annually to assure that the energy control procedures (locks and tags) continue to be implemented properly and that the employees are familiar with their responsibilities under those procedures. In addition, the employer must certify that the periodic inspections have been performed. The certification

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must identify the machine or equipment on which the energy control procedure was used, the date of the inspection, the employees included in the inspection, and the name of the person performing the inspection. For lockout procedures, the periodic inspection must include a review, between the inspector and each authorized employee, of that employee’s responsibilities under the energy control procedure being inspected. When a tagout procedure is inspected, a review on the limitation of tags, in addition to the above requirements, must also be included with each affected and authorized employee.

Application of Controls & Lockout/Tagout Devices
The established procedure of applying energy controls includes the specific elements and actions that must be implemented in sequence. (See 29 CFR 1910.147(d) for the detailed requirements and language of the OSHA standard.) These are briefly identified as follows.
1. Prepare for shut down.
2. Shut down the machine or equipment.
3. Apply the lockout or tagout device.
4. Render safe all stored or residual energy.
5. Verify the isolation and de-energization of the machine or equipment.

Removal of Locks & Tags
Before lockout or tagout devices are removed and energy is restored to the machine or equipment, the authorized employee(s) must take the following actions or observe the following procedures:
1. Inspect the work area to ensure that nonessential items have been removed and that machine or equipment components are intact and capable of operating properly;
2. Check the area around the machine or equipment to ensure that all employees have been safely positioned or removed;
3. Notify affected employees immediately after removing locks or tags and before starting equipment or machines; and
4. Make sure that locks or tags are removed ONLY by those employees who attached them. (In the very few instances when this is not possible, the device may be removed under the direction of the employer, provided that he or she strictly adheres to the specific procedures outlined in the standard.)

Additional Safety Requirements
Special circumstances exist when (1) machines need to be tested or repositioned during servicing, (2) outside (contractor) personnel are at the work site, (3) servicing or maintenance is performed by a group (rather than one specific person), and (4) shifts or personnel changes occur.
• Testing or positioning of machines. OSHA allows the temporary removal of locks or tags and the re-energization of the machine or equipment ONLY when necessary under special conditions – for example, when power is needed for the testing or positioning of machines, equipment or components. The re-energization must be conducted in accordance with the sequence of steps listed below:
1. Clear the machines or equipment of tools and materials.
2. Remove employees from the machines or equipment area.
3. Remove the lockout or tagout devices as specified in the standard.
4. Energize and proceed with testing or positioning.
5. De-energize all systems, isolate the machine or equipment from the energy source, and reapply lockout or tagout devices as specified.
• Outside personnel (contractors, etc.) The onsite employer and the outside employer must inform each other of their respective lockout or tagout procedures. Each employer must ensure that his or her personnel understand and comply with all restrictions and/or prohibitions of the other employer’s energy control program.

• Group lockout or tagout. During all group lockout/tagout operations where the release of hazardous energy is possible, each authorized employee performing servicing or maintenance shall be protected by his/her personal lockout or tagout device or comparable mechanism that affords equivalent protection.

• Shift or personnel changes. Specific procedures must ensure the continuity of lockout or tagout protection during shift or personnel changes.