The Control of Hazardous Energy (Lockout/Tagout)

by Brian Zachetti

Before you begin

To prepare for the following discussion, please obtain a copy of your company's lockout/tagout procedures for review during your reading. We encourage you to share this information with applicable employees and discuss the details of your specific program.

Introduction

Lockout/tagout refers to procedures that prevent the unexpected energization or startup of machinery. It also refers to processes that prevent the release of hazardous energy during service or maintenance activities. Approximately 3-million workers perform routine maintenance on equipment. These workers face the risk of injury if their employers do not implement lockout/tagout practices. Safety experts estimate implementation of these procedures could prevent 120 fatalities and 50,000 injuries each year.

The governing standards for the control of hazardous energy (lockout/tagout) are 29 CFR 1910.147 and NFPA 70E , "Standard for Electrical Safety Requirements for Employee Workplaces." Both standards require the control of hazardous energy during service and maintenance activities. This includes activities in which the unexpected energization or start up of the machines or equipment, or release of stored energy could cause injury to employees.

OSHA 1910.147(b) defines maintenance activities as installation, setup, adjustment, inspection, modification and routine maintenance or servicing of machines or equipment.

The lockout/tagout standard does not cover cord-and-plug-connected machines and/or equipment if unplugged. The plug is under the exclusive control of the operator, and the electricity is the only form of hazardous energy. In addition, the standard does not cover normal production operations unless:

- O An employee must remove or bypass a guard or other safety device;
- O An employee must place any part of his or her body into an area on a machine or piece of equipment where work is performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

Physical harm and possible death may occur when employees perform service or maintenance activities on energized equipment. You must isolate equipment from the energy source and lock out the energy source to prevent uncontrolled hazardous energy. Energy isolating devices do not include motor circuit control devices such as emergency stops, light curtains, interlocking mechanisms on guards or presence sensing devices. Employees involved in the lockout/tagout process have different levels of responsibility. Therefore, they must have different knowledge bases about the process. There are three types of employees.

1. Authorized employee

This person locks out or tags out machines or equipment to perform servicing or maintenance. You must train authorized employees on recognition of the types and magnitudes of hazardous energy sources, the specific procedures developed for controlling those energy sources and knowledge of the equipment used in the lockout/tagout process.

2. Affected employee

This person operates or uses a machine or equipment on which servicing or maintenance is happening under lockout or tagout. He or she also could work in an area in which such servicing or maintenance is under way. You must train affected employees on the purpose of the lockout/tagout program and to recognize when energy-control procedures are in use. They should understand the importance of not tampering with lockout and tagout devices and not starting or using locked or tagged-out equipment.

3. Other employee

This person's job responsibilities do not relate to the servicing or maintenance. These individuals must understand what the program is about and not to tamper with lockout devices. You must train other employees on the purpose of the lockout/tagout program and to recognize when

energy-control procedures are in use. They should understand the importance of not tampering with lockout and tagout devices and not starting or using locked or tagged-out equipment.

Hazardous energy
Hazardous energy sources take place in many forms and can be present in different quantities. It is important that when conducting lockout/tagout on a particular piece of equipment that you identify and quantify each energy source. The following are examples of hazardous energy:

1. Electrical - electrical circuits, panel boards, capacitors, etc.;
2. Mechanical - moving parts, blades, conveyers, springs;
3. Hydraulic - hydraulic presses, injection molding machinery;
4. Pneumatic - compressed air;
5. Chemical - corrosive materials, acids, bases;
6. Thermal - steam, hot fluids, furnaces;
7. Gravity - press dies, overhead doors.

Lockout /tagout and energy isolating devices
An energy-isolating device physically prevents the transmission or release of hazardous energy. These devices include, but are not limited to, the following: electrical circuit breaker, disconnect switch, a line valve, a block and any similar device used to block or isolate energy.

A lockout device holds energy-isolation devices in a safe or off position. They provide physical protection to employees by preventing them from operating the energy-isolating device. Thus, it prevents the energizing of equipment. Lockout devices are durable equipment designed for this purpose. They work by affixing an individual lock to each device. You must standardize the lockout devices within the facility in at least one of the following criteria: color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

In rare occasions, it may not be possible for an energy-isolating device to accept a lockout device. In these situations, you may use tagout devices in lieu of a lockout device. Tagout devices are warning tags fastened to energy-isolating devices. They warn employees not to re-energize equipment that an employee is servicing. Tagout devices are easier to remove, and they provide employees with less protection than lockout devices.

Tagout devices must be constructed and printed 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. Make sure repaired, modified or renovated machines or equipment accept a lockout device. Do the same when installing new machines or equipment.

Energy-control procedures
Employers must develop procedures for the control of hazardous energy sources. Authorized employees who lockout or tagout equipment during service and maintenance must use these procedures. Lockout procedures must include the following:

- The intended use of the procedure;
- Steps for shutting down, isolating, blocking and securing equipment;
- Steps for the placement, removal and transfer of lockout devices;
- Equipment-testing requirements to verify the effectiveness of the energy-control measures;
- Group lockout is permitted under 1910.147(f)(3) when multiple persons (crew, craft, department, etc.) are involved in the service or maintenance of equipment. The standard also allows for the transfer of lockout or tagout devices during shift changes when written procedures are in place.

Employer responsibilities
Employers must implement and enforce an energy control program that consists of many different requirements.

- Develop, implement, and enforce an energy control program.
- Provide effective employee training about lockout/tagout to all employees appropriate to their level of involvement.
- Develop specific procedural steps for shutting down equipment to control hazardous energy.
- Provide durable, substantial, and standardized lockout and tagout devices and hardware. Lockout and tagout devices must identify who applied them. Employees may not use them for other purposes.
- Provide lockout devices for equipment that you can lock out. Keyed devices must be unique to the device and under the control of each employee working on the equipment.
- Ensure employees can lock out new or existing equipment undergoing major repairs, renovations or modifications.
- Establish written procedures that permit only the employee who applied a lockout or tagout device to remove it. These must include provisions for device removal when the employee is not available.
- Inspect energy-control procedures at least annually.
- Develop specific procedures for handling shift changes when lockout/tagout may extend beyond one shift to ensure continuity of protection.
- Provide tagout devices instead of lockout devices only if the tagout program provides employee protection equivalent to that provided by a lockout program. You cannot use tagout devices if you can lock out machines or equipment.

Employee responsibilities
Employees play an integral part of the lockout/tagout process. Involve them in the development of procedural components of the program and in routine inspections of energy control procedures.

- Employees must comply with all applicable rules concerning lockout/tagout.
- Authorized employees must inform all affected employees of equipment shutdown.
- When shutting down equipment, employees must isolate or block hazardous energy, remove any potential (stored) energy, lockout or tagout the energy source(s), verify the isolation and de-energization of equipment.
- Before placing equipment back into service, employees must remove tools and replace machine components. This includes safety guards. Inform co-workers about energy-control device removal, ensure all workers are clear of the work area, and verify machine or equipment power controls are off or in a neutral position.

Periodic inspection
At least annually, employers must inspect and certify all energy control procedures. They must also ensure compliance with 29 CFR 1910.147 Control of Hazardous Energy (Lockout and Tagout). An authorized employee must perform the periodic inspection. He or she must not typically use the energy control procedure under inspection. The inspection documentation must identify the equipment, date of the inspection, person performing the inspection and all employees included in the inspection. Conduct the periodic inspection to evaluate and correct any deficiencies in the program. This includes the accuracy of procedural steps for de-energizing equipment, employee knowledge and accountability. Best practice suggests periodic inspections become a part of an ongoing quality process rather than a once a year evaluation.

Training and re-training
Employers must provide training that employees understand. In addition, they must ensure employees retain the skills to safely apply, use and remove lockout and tagout devices in accordance with the specific energy control procedures.

Employers must train authorized employees on:

- Recognition of the types and magnitudes of hazardous energy sources;
- The specific procedures developed for controlling those energy sources;
- Knowledge of the equipment used in the lockout/tagout process.

In addition, they must keep records documenting employee training, employee names and training dates. Employers must also train affected and other employees on the purpose of the lockout/tagout program. They must be able to recognize when energy-control procedures are in use. They should understand the importance of not tampering with lockout and tagout devices and not starting or using locked or tagged-out equipment. Retraining is necessary when there is a change in energy-control procedures, machines, equipment or processes. You also must re-train when an inspection reveals or an employer has reason to believe that shortcomings exist in an employee's knowledge about the energy-control procedure.

References

OSHA 29 CFR 1910.147 The Control of Hazardous Energy (Lockout and Tagout)

OSHA Lockout/Tagout Fact Sheet

NFPA 70E, "Standard for Electrical Safety Requirements for Employee Workplaces"

Ohio BWC OCOSH Manual "Lockout Tagout & Safety Related Work Practices"

Article submitted by:
Brian Zachetti, BWC Industrial Safety Consultant Specialist