

Control of hazardous energy (lockout/tagout) by Brian Zachetti

Before you begin

To prepare for the following discussion, obtain a copy of your employer's lockout/tagout procedures for review. 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 protect employees from the unexpected energization or startup of machinery. It also refers to the release of hazardous energy during service or maintenance activities.

According to OSHA's Lockout/Tagout Fact Sheet, approximately 3 million workers perform routine maintenance on equipment and face the risk of injury if they do not follow lockout/tagout practices. These procedures prevent an estimated 120 fatalities and 50,000 injuries each year.

Standards

The governing standards for the control of hazardous energy (lockout and tagout) are 29 CFR 1910.147 and National Fire Protection Association (NFPA) 70E, *Standard for Electrical Safety Requirements for Employee Workplaces*. Both standards require that you control the hazardous energy during service and maintenance activities where the following could cause employee injuries:

- o Unexpected energization;
- o Start up of the machines;
- o Release of stored energy.

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

The standard does not cover cord-and-plug-connected machines and/or equipment if they are unplugged, and the plug is under the exclusive control of the operator and electricity is the only form of hazardous energy.

In addition, the standard does not cover normal production operations unless the employee is required to:

- o Remove or bypass a guard or other safety device;
- o Place any part of his or her body into an area on a machine or piece of equipment where they perform work upon the material being processed (point of operation). This is also true where an associated danger zone exists during a machine-operating cycle;

Employees performing servicing or maintenance activities on energized equipment are exposed to physical harm and possible death. Isolate the equipment from the energy source and lock the energy source out to prevent uncontrolled hazardous energy.

Motor-circuit control devices such as emergency stops, light curtains, interlocking mechanisms on guards, or presence-sensing devices are not energy-isolating devices.

Employees doing the lockout/tagout process have different levels of responsibility, and therefore, have different knowledge bases about the process. Employees are categorized into three types:

- o **Authorized employee** — This person locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment. Authorized employees must be trained on:
 - Recognizing the types and magnitudes of hazardous energy sources;
 - Developing the specific procedures for controlling those energy sources, and knowing the equipment used for the lockout/tagout process.
- o **Affected employee** — This is a person whose job requires him or her to operate or use a machine or equipment on which he or she performs servicing or maintenance under lockout or tagout, or whose job requires him or her to work in an area where employees perform servicing or maintenance. Train affected employees on the lockout/tagout program's purpose and to recognize when using energy-control procedures. They must understand the importance of not tampering with lockout and tagout devices and not starting or using locked or tagged-out equipment.
- o **Other employee** — This is a person with job responsibilities completely unrelated to servicing or maintenance. These individuals must at least understand what the program is about and not tamper with lockout devices. Train other employees on the lockout/tagout program's purpose and recognize when you are using energy-control procedures. Employees must understand the importance of not tampering with lockout/tagout devices and not starting or using locked or tagged-out equipment.

Hazardous energy

Hazardous-energy sources take place in many different forms and are present in different quantities. It is important 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:

- o **Electrical** — electrical circuits, panel boards and capacitors, etc.;
- o **Mechanical** — moving parts, blades, conveyers and springs;
- o **Hydraulic** — hydraulic presses and injection-molding machinery;
- o **Pneumatic** — compressed air;
- o **Chemical** — corrosive materials, acids and bases;
- o **Thermal** — steam, hot fluids and furnaces;
- o **Gravity** - press dies and 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:

- o Electrical circuit breaker;
- o Disconnect switch;
- o A line valve, a block;
- o 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 by preventing an employee from operating the energy-isolating device and energizing the equipment. Lockout devices are durable equipment designed for this purpose, and they work by affixing an individual lock to each device. You must standardize lockout devices within the facility in at least one of the following criteria for:

- o Color;
- o Shape;
- o Size.

In addition, in the case of tagout devices, you must standardize print and format.

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 that warn employees not to re-energize equipment employees are servicing. Tagout devices are easier to remove and provide employees with less protection than lockout devices.

You must construct and print tagout devices so exposure to weather or wet and damp locations will not cause the tag to deteriorate or the message on the tag to be illegible. Whenever you replace, make a major repair, do renovation or modify equipment and whenever you install new machines or equipment, make sure you design energy-isolating devices for machines or equipment to accept a lockout device.

Energy-control procedures

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

- o Intended use of the procedure;
- o Steps for shutting down, isolating, blocking and securing equipment;
- o Steps for placing, removing and transferring lockout devices;
- o Equipment-testing requirements to verify the effectiveness of energy-control measures.

You can do group lockout under OSHA's 1910.147(f)(3) when multiple persons (crew, craft, department, etc.) service or maintain the equipment. The standard also allows for transferring 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. Employers must:

- o Develop, implement and enforce an energy-control program;
- o Provide effective employee training about lockout/tagout to all employees commensurate to their levels of involvement;
- o Develop specific procedural steps for shutting down equipment to control hazardous energy;
- o Provide durable, substantial and standardized lockout and tagout devices and hardware. Lockout and tagout devices must identify who applied them and you may not use them for other purposes;

- o Provide lockout devices for equipment you can lock out. Keyed devices must be unique to the device and under the control of each employee working on the equipment;
- o Make sure all new equipment or any existing equipment that undergoes major repairs, renovations or modifications, is capable of being locked out.
- o Establish written procedures that permit only the employee who applied a lockout or tagout device to remove it. The procedures must include provisions for device removal when the employee is not available;
- o Inspect energy-control procedures at least annually;
- o Develop specific procedures for handling shift changes when lockout/tagout may extend beyond one shift to ensure continuity of protection;
- o Provide tagout devices instead of lockout devices only if the tagout program provides employee protection equivalent to that provided by a lockout program. Do not use tagout devices if you can lock out machines or equipment.

Employee responsibilities

Employees play an integral part in the lockout/tagout process. Involve them in developing the program's procedural components and involve them in routine inspections of energy-control procedures.

- o Employees must comply with all applicable rules concerning lockout/tagout.
- o Authorized employees must inform all affected employees of equipment shutdown.
- o 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-energize the equipment.

Before you place equipment back into service, employees must:

- o Remove tools and replace machine components, including safety guards;
- o Inform co-workers about energy-control device removal;
- o Make sure all workers are clear of the work area;
- o Verify that 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 also must make sure the employer complies with OSHA's 29 CFR 1910.147 *Control of Hazardous Energy (Lockout and Tagout)*. An authorized employee performs the periodic 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 such as the accuracy of procedural steps for:

- o De-energizing equipment;
- o Employee knowledge;
- o Accountability.

Best practices suggests that 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 is easy for employees to understand. In addition, they must make sure employees retain the skills to safely apply, use and remove lockout and tagout devices in accordance with the specific energy control procedures. Train authorized employees on recognizing the types and magnitudes of hazardous energy sources, the specific procedures developed for controlling those energy sources and understanding the equipment used in the lockout/tagout process.

Keep records documenting the employee training, employees' names and the training dates. Train affected and other employees on the lockout/tagout program's purpose and recognize when you use energy-control procedures. 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. In addition, repeat training when an inspection reveals or an employer believes that shortcomings exist in an employee's knowledge about the energy-control procedure.

References

Regulations

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

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

Publications

BWC OCOSH Manual *Lockout Tagout & Safety-Related Work Practices*

OSHA Lockout/Tagout Fact Sheet

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