



Best Practices for Control of Hazardous Energy (Lockout/Tagout)

Scope

The scope of this best practice covers the Control of Hazardous Energy, commonly referred to as Lockout/Tagout. This activity is regulated by OSHA under 29 CFR 1910.147 and the reader must be thoroughly familiar with this regulation. Although this best practice provides commentary on certain aspects of the regulation, it is not intended to be used in lieu of the regulation. Control of hazardous energy is critical to protecting workers from potentially fatal or serious injuries, and an effective program will protect employees from injury due to the unexpected energization of equipment.

Key Points

- We believe you will find the Energy Control Procedure at the end of this document far more useful than the Energy Control Procedure sample provided in Appendix A of the regulation.
- When applying lockout devices on valves, make sure the valve cannot be operated.
- Audit your facility to ensure that personal lockout locks and energy isolation locks/devices are ONLY used for this purpose. A good place to start on an audit are locks on personal lockers.
- For multiple-day lockouts, best practice is to remove personal locks at the end of the shift and to reapply them when the employees return the following day. This minimizes the chance that when the job is completed, personal locks remain for workers who are not on-site.
- In situations where group lockout boxes are employed, it is critical that the group lock boxes be clearly labeled and recorded on the Energy Control Procedure. Near misses have occurred when a mechanic or contractor has applied their personal lock to the wrong lock box. This issue should be addressed during pre-task briefings when multiple group lockout boxes are in use.
- Commercially available group lockout boxes vary in quality. Ensure that the boxes cannot be easily tampered with to improperly remove keys.
- Tagout instead of lockout is strongly discouraged.
- Required periodic (at least annual) inspections of Energy Control Procedures can be streamlined by grouping energy control procedures for similar equipment and magnitudes of energy.
- An annual review of the written Energy Control Program is recommended in addition to the required annual periodic inspection (audit) of the Energy Control Procedures.
- Annual recurring training is strongly recommended.



Types of Hazardous Energy

Hazardous energy comes in many forms. These include, but are not limited to electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravity (suspended loads) and radiation. In some cases, the energy may be stored and must be addressed and rendered safe. Examples of stored energy include residual gas or liquid pressure in a pipeline, spring energy, stored electricity in a capacitor or battery, etc.

Energy Control Program

Every facility is required to have a documented Energy Control Program. This is typically in the form of a documented safe work practice specific to this subject. OSHA requires the following three elements: Established Energy Control Procedures, employee training and annual program reviews. Best practice requires the following:

- Establish roles and responsibilities
- Define the scope of the program and any exceptions that may apply to troubleshooting and normal production operation activities (e.g., opening valves/hatches to add raw materials)
- Specify what personal locks that may be used and provisions for use of “group lockout boxes” (discussed below)
- Define any special provisions required for lockout during confined space entry
- Develop a blank checklist for the annual reviews of Energy Control Procedures.
- Set procedures for removal of a personal lock by someone other than the individual who installed it.
- Review the Energy Control Program periodically, but no less than once each year.

Energy Control Procedures

For each specific equipment item to be isolated, develop an Energy Control Procedure, sometimes called an energy control checklist, equipment isolation checklist or some other similar name. This document identifies each isolation point in checklist form to record who applied the lock at each location, who independently verified the lock application, and when it was removed. These are typically prepared well in advance (the listing of isolation points) and kept on file until needed. For unique lockouts that can't be anticipated, a blank Energy Control Procedure can be used and filled in by hand immediately prior to equipment lockout.

OSHA states the following as regards Energy Control Procedures:

“The energy-control procedures must outline the scope, purpose, authorization, rules, and techniques that employees will use to control hazardous energy sources, as well as the means that will be used to enforce compliance. These procedures must provide employees at least the following information:

- A statement on how to use the procedures;
- Specific procedural steps to shut down, isolate, block, and secure machines;



- Specific steps designating the safe placement, removal, and transfer of lockout/tagout devices and identifying who has responsibility for the lockout/tagout devices; and
- Specific requirements for testing machines to determine and verify the effectiveness of lockout devices, tagout devices, and other energy-control measures.”

Regarding the last bulleted item on testing machines to verify the effectiveness of the lockout, there are some key points regarding electrical motors. Electrical motors can present unique risks when testing to verify that they are properly locked out. For example, a motor that was not properly isolated may not start when tested due to an interlock or timer unrelated to the lockout, giving false indication that the lockout was effective. This risk can be addressed by having a qualified electrician install a test button that bypasses all timers and interlocks. Another way to address the risk of an improper electrical motor lockout is to have a qualified electrician participate in the testing/verification step to ensure that the lockout is effective.

Energy control procedures are to be inspected periodically, at least annually. OSHA has clarified in a letter of interpretation to allow grouping of energy control procedures for similar equipment and magnitudes of energy for the purposes of periodic inspections. This streamlines the periodic inspection process. Ensure these inspections are documented.

Energy Isolation Devices and Lockout Devices

OSHA defines an **Energy Isolation Device** as “a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.”

OSHA defines a **Lockout Device** as “a device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.” Per OSHA, lockout devices must be:

- Standardized by color, shape, or size and only used for this purpose.
- Substantial
- Identifiable

Some energy isolation devices are easier to apply a lockout device than others, but there are a remarkable number of devices commercially available to lock out almost anything. Valves are typically locked out with chains or the valve may have aligning holes to apply a lock when the valve is in the closed position. When locking valves, ensure that the valve can't be operated.



When removing isolation devices, it is good practice to have a knowledgeable employee complete a field inspection to assure all devices are removed prior to startup.

Personal Lockout Devices

Locks applied by individuals must identify individual users. This can be done by affixing a tag to the lock with this information or writing this information directly on the lock, if the lock is designed to do so. Per OSHA, personal locks for lockout must be:

- Standardized by color, shape, or size and only used for this purpose.
- Substantial
- Identifiable

The facility's Energy Control Program should document the specific lock to be used. It is highly recommended that the facility audit itself to ensure that this lock isn't being used for any other purpose. A good place to start the inspection is with locks applied to personal lockers.

Personal locks must be removed only by the person who installed it. Best practice is to remove personal locks each day and reapply them the following day. This minimizes the chance that when the job is completed, personal locks remain for workers who are not on-site.

Ensure your Energy Control Program has a procedure to remove a lock for an individual who has left the facility. This typically involves attempting to contact the individual, involving the Safety Department, documenting removal/cutting of the lock, and communication to the individual. It's very important to communicate to the worker of the lock removal. This will prevent the worker from resuming work upon his or her return, assuming that the personal lock is still in place. If personnel are issued a badge to enter the facility, consider shutting off access to the facility until this communication can occur.

Group Lockout Boxes

The regulation allows for the facility's Energy Control Program to include provisions for a group lockout system, as long as the same level of protection is provided to personnel. The group lockout box can make equipment isolation more efficient and equally effective when there are multiple users and multiple lockout device keys being used. Individual personal locks are then applied to the group lockout box.

On large turnarounds, there may be multiple group lockout boxes employed for different process equipment. Near misses have occurred when the employee affixes his or her personal lock to the wrong group lockout box. Communication must be clear, and a pre-task briefing is a good way to do this. Another level of protection is to clearly identify on the energy isolation procedure the name or number of the applicable group lockout box.



Commercially available group lockout boxes vary significantly in quality. Examine these to ensure that keys can't fall out or that the box can't be easily tampered with to improperly remove keys. Ideally, a group lockout box has a transparent cover with hooks to display the keys for the lockout devices.

Tagout

Although OSHA allows the use of tagout in lieu of lockout, the tagout must provide the same level of protection as locks. Best practice is to completely avoid use of a tagout-only system.

Devices with a Single Isolation Point

"Cord and Plug" Devices

Per OSHA, these devices are exempt from the lockout standard. However, if there is a second isolation point, such as a compressed air line, the exemption would not apply. OSHA states: "Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance."

Other Equipment Isolated by a Single Isolation Point

These devices fall under the regulation, but are not required to have an Energy control procedure.

Employee Training

OSHA requires initial employee training and recurring training. OSHA states that recurring training should occur when whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, when there is a change in the energy control procedures, or when the periodic (annual) inspection reveals deviations or deficiencies. Best practice for recurring training is to do this on a scheduled basis (e.g. every year, every other year) and also to consider incident and near miss history when establishing a frequency.

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SAMPLE ENERGY CONTROL PROCEDURE

Date: _____
Equipment to be Isolated: _____
Reason for isolation: _____
Work Order Number(s): _____

Equipment (Description or Location) Example: T-1 Agitator Motor Note 1	Describe Action Taken	Key Number	Initials of Person(s) Isolating Equipment	Initials of Person(s) Testing and Verifying	Initials of Person(s) Unlocking Equipment	Initials of Person(s) Confirming Unlocking (Optional Column)	Comments
	open/close/dis- connect, etc.						
Add more rows as needed.							

Note 1. Magnitude of energy being isolated is ≤ 150 psig and ≤ 480 volts and ≤ 212°F unless specified otherwise in this column.



Additional Notes or Comments

Name and Initials of Persons Initialing Boxes in Above Procedures:

Name (Print): _____	Initials: _____
_____	_____
_____	_____
_____	_____

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