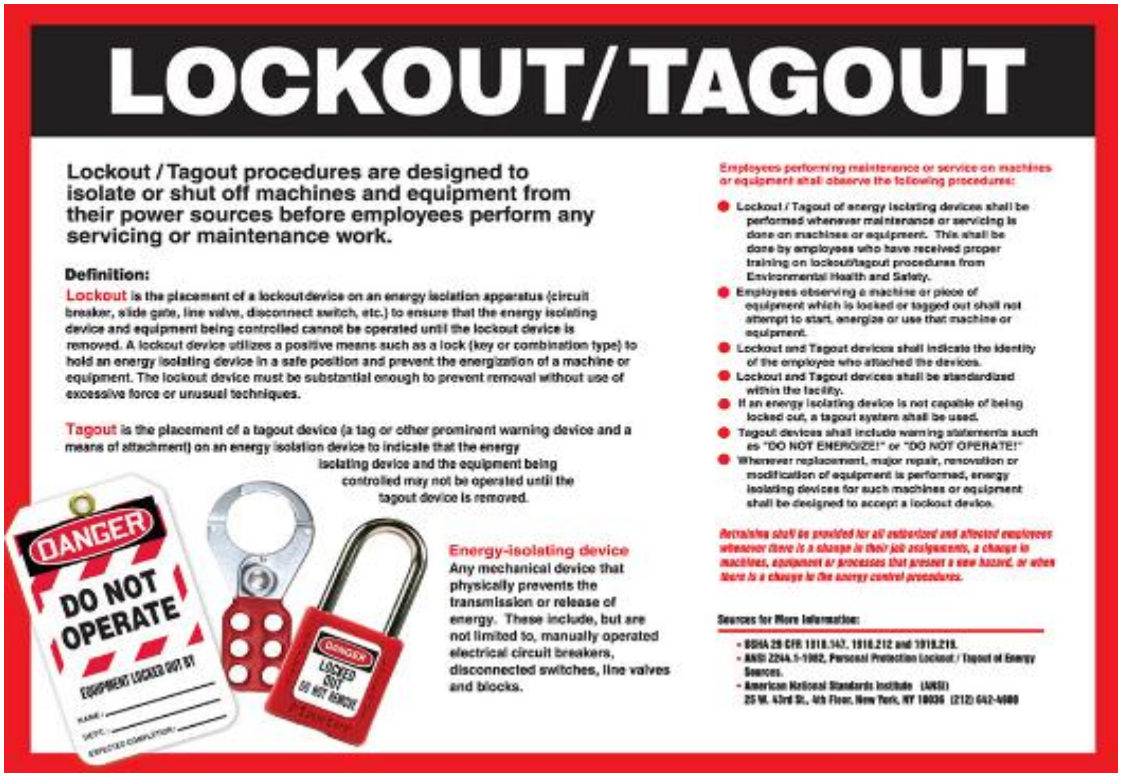
An Example Of An Effective Lockout-Tagout Procedure



Lockout-tagout (LOTO) or lock and tag is a safety procedure which is used in industry and research settings to ensure that dangerous machines are properly shut off and not able to be started up again prior to the completion of maintenance or servicing work.

The procedure outlined in this article establishes the minimum requirements for the lockout or tagout of energy-isolating devices. Lockout is the preferred method of isolating fixtures, equipment or machinery from energy sources. It shall be used to ensure that the fixture, equipment or machinery is isolated from all potentially hazardous energy and locked out or tagged out before associates perform any servicing or maintenance activities where the unexpected energization, start-up or release of stored energy could cause bodily injury and/or to prevent damage to fixtures, equipment, machinery or the environment.

Definitions

Affected associate: This is an associate who works in an area where servicing or maintenance operations are performed. An affected associate does not perform servicing or maintenance on machines or equipment and, consequently, is not responsible for implementing lockout/tagout procedures. However, an authorized associate and an affected associate may be the same person when the affected associate's duties also involve performing maintenance or service. An affected associate becomes an authorized associate whenever he or she performs servicing or maintenance functions.

Authorized associate: This is an associate who performs servicing or maintenance on equipment and machinery. This associate implements lockout/tagout procedures to guarantee his or her own protection.

Capability of being locked out: An energy-isolating device is considered capable of being locked out if it meets one of the following requirements:

- It is designed with a hasp to which a lock can attached.
- It is designed with any other integral part through which a lock can be affixed.
- It has a locking mechanism built into it.
- It can be locked without dismantling, rebuilding or replacing the energy-isolating device or permanently altering its energy control capability.

Energized: Equipment and machinery is energized when they are connected to an energy source or contain residual or stored energy.

Energy control procedure: This is a written document that contains the steps an authorized associate must follow to safely control hazardous energy during servicing or maintenance of equipment or machinery.

Energy control program: This is a program intended to prevent the unexpected energizing or the release of stored energy in equipment or machinery. The program consists of:

- Energy control procedures.
- An associate training program.
- Periodic inspections of the associates using the procedures and a procedure review.

Energy-isolating device: This is a mechanical device that physically prevents the transmission or release of energy.

Energy source: This is any source of electrical, mechanical, hydraulic, pneumatic, chemical, steam, thermal or other energy.

Lockout: Placing a lock on an energy-isolating device according to an established procedure, that ensures that the fixture, equipment or machinery cannot be energized until the lock is removed by the person who placed it there.

Lockout device: This is a device that utilizes a positive means such as a lock to hold an energy-isolating device in a safe position and prevent the energizing of fixtures, equipment or machinery.

Tagout: This is the placement of a tagout device on an energy-isolating device, according to an established procedure, clearly marked by means of a

tag that states who has the fixture, equipment or machinery shut down and that the equipment or machinery must not be operated until the tagout device is removed by the associate who place it there.

Tagout device: This is any prominent warning device, such as a tag and a means of attachment,that can be securely fastened to an energy-isolating device according to established procedure. The tag indicates that the equipment or machinery to which it is attached must not be operated until the tagout device is removed according to the energy control procedure. The attachment method must be substantial and not easily removed.

Zero energy state: All sources of energy have been controlled and/or dissipated.

Responsibilities

Director: Retains overall responsibility for this procedure.

Engineering manager: This person is responsible to ensure that all engineering associates are aware of this procedure and are trained in its use and application. All training is to be documented and copies sent to the facilities management (FM) personnel coordinator and to the facilities management safety manager. He or she ensures that contractors are aware of this procedure.

Assistant director for operations and FM managers: Responsible to ensure that all maintenance personnel are aware of this procedure and are trained in its use and application. All training is to be documented and copies sent to the FM personnel coordinator and to the FM safety manager. Ensure that contractors are aware of this procedure.

FM safety manager: Responsible for auditing this procedure, those procedures are consistent throughout facilities management and that documentation is accurate.

Institutional fire safety inspectors: Responsible to check for the existence or non-existence of written energy control (shutdown/startup) procedures in mechanical equipment rooms and to so indicate on their inspection report. A copy of the inspection report is to be sent to the FM safety manager.

Maintenance supervisors: Responsible to ensure that all maintenance personnel are aware of this procedure and are trained in its use and application. Names and job titles of associates who are authorized to lock out or tag out shall be documented and copies sent to the FM personnel coordinator and to the FM safety manager. Each new or transferred associate and other associates whose work operations are or may be in the area shall be trained in the purpose and use of this lockout or tagout procedure. Supervisors shall verify the accuracy of existing written energy control (shutdown/startup) procedures,

write them if they are non-existent, obtain adequate supplies, maintain the inventory and document the issuance of locks, tags and locking devices.

Maintenance associates: Responsible to know and to understand the important safety significance of this procedure and its proper application. If violations of this procedure are observed, notify your supervisor and the FM safety manager immediately.

Hazard analysis

A written hazard analysis shall be performed by scheduled maintenance associates for each piece of equipment and machinery that is used, serviced or maintained. Be sure to include stored equipment and machinery. This begins with an inventory to be recorded on an energy hazard assessment inventory form. Send a copy of this form to the FM safety manager.

As the inventory is completed for each building, a more detailed evaluation of each piece of equipment or machinery shall be completed. Document all energy sources (direct and hidden), the hazards posed, the magnitude or measurable degree of danger, any special or unusual conditions, and the proper isolation methods and devices. Record these items on the detailed energy hazard assessment form. Send a copy of this form to the FM safety manager.

The assessment forms serve as the building blocks for developing written energy control (shutdown and startup) procedures. As these energy control procedures are completed, send them to the FM safety manager for review.

Procedure

A) ***Basic rules for using lockout or tagout system procedures***

- All energy sources to fixtures, equipment and/or machinery shall be locked out or tagged out to protect against accidental or inadvertent operation when such operation could cause injury to personnel.
- Note that isolating a piece of equipment from its source may not eliminate all potential hazards. Stored energy may be present within the equipment or machinery.
- Do not attempt to operate any switch, valve or other energy isolation device when it is locked or tagged out.
- Never remove a lock or tag for another associate. Only the associate placing the lock or tag may remove it. If there is a need to remove another associate's lock or tag in an emergency, only the maintenance supervisor may do so after making every effort to contact the owner of the lock or tag.

B) Sequence to lock out or tag out

- The supervisor shall make a survey to locate and identify all isolating devices to be certain which switch(s), valve(s) or other energy-

isolating devices apply to the equipment to be locked or tagged out. More than one energy source (electrical, mechanical or others) may be involved.

- Verify the written energy control (shutdown/startup) procedure attached to the equipment or machinery, make necessary changes, supply the written procedure in the absence thereof, and send a copy of the procedure or changes to an existing procedure to the FM safety manager for review.
- The supervisor or lead man shall notify all affected associates and customers that a lockout or tagout system is going to be utilized and the reason for that action. The authorized associate shall know the type and magnitude of energy that the machine or equipment utilizes and shall understand the hazards thereof.
- If the machine or equipment is operating, shut it down by the written energy control (shutdown) procedure attached to the equipment or machine (depress stop button, open toggle switch, etc.).
- Operate the switch, valve or other energy-isolating device(s) to ensure that the equipment is isolated from its energy source(s). Stored energy (such as that in spring, elevated machine members, rotating flywheels, hydraulic systems and air, gas, steam and water pressure, etc.) must be dissipated or restrained by methods such as repositioning, double blocking and bleeding down, etc.
- Lockout and/or tagout the energy-isolating devices with assigned individual lock(s) or tag(s). Tags shall indicate that the energy-isolated device(s) shall not be operated until after the removal of the tag.
- After ensuring that no personnel are exposed, and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate.
- Caution: Return operating control(s) to “neutral” or “off” position after the test.
- The equipment is now locked out or tagged out.

C) Restoring machines or equipment to normal production operations

- After servicing and/or maintenance is completed and the fixture, equipment or machinery is ready for normal operation, check the area around the fixture, equipment or machinery to ensure that no one is exposed.

- After all tools have been removed from the fixture, equipment or machinery, guards have been reinstalled and associates are in the clear, remove all lockout or tagout devices. Notify all affected persons that the lockout or tagout has been removed. Operate the energy- isolating devices to restore energy to the fixture, equipment or machinery following the written energy control (startup) procedure.

D) Procedure involving more than one person

- In the preceding steps, if more than one individual is required to work on the equipment or machinery, each shall place his/her own personal lockout device and/or tagout device on the energy-isolating device(s). When an energy-isolating device cannot accept multiple locks and tags, a multiple lockout or tagout device (box or hasp) may be used.
- If lockout is used, a single lock may be used to lock out the machine or equipment with the key being placed in a lockout box or cabinet which allows the use of multiple locks to secure it. Each associate will than use his/her own lock to secure the box or cabinet. As each person no longer needs to maintain his or her lockout protection, that person will remove his/her lock from the box or cabinet.
- When work must continue over a shift change the supervisor or lead worker must ensure that all associates are aware of which locks are to be replaced or left in place. All associates in the oncoming shift must be informed of the lockout/tagout conditions.

E) Additional requirements

1) Engineering manager, FM managers and supervisors should annually verify that all associates are in compliance with the requirements of this procedure. A periodic lockout/tagout inspection form shall be used and a copy of the completed form sent to the FM safety manager.

2) Initial training must be provided for all authorized and affected associates, repeated annually and documented. Additional retraining for all authorized and affected associates must be provided whenever there is a change in equipment, machinery, procedures or whenever there is evidence that this procedure is being violated.

3) Locks provided by facilities management are the only authorized locks to be used for equipment or machine lockout. Each lock should be keyed separately. One key issued to the authorized associate possessing the lock and the other key kept by the supervisor for emergency situations only.

4) Each lock should be identified as to its owner. In lieu of identification on the lock, an authorized associate’s personal tag can be applied in addition to his/her lock when locking out the equipment or machinery so that the lock’s owner can be readily identified.

5) The tags, padlocks and lockout devices used for locking out machinery and equipment should only be used for lockout and not for any other activity.

6) All equipment or machinery should be provided with appropriate energy isolating devices. Each such energy-isolating device should be clearly identified by a label. Only where such devices are not now existent may tagout be used.

- Whenever the equipment or machinery is modified or rebuilt, the energy control device must be altered to allow the incorporation of a lock for lockout purposes.
- When new or replacement equipment or machinery is ordered, the specifications shall include the capability of locking out the energy source(s).

7) All equipment or machinery that is required to be locked or tagged out shall have a written energy control (shutdown/startup) procedure attached to or near the main power switch for that equipment or machinery. This procedure is to identify all the energy sources which may be acting on this equipment and detail how each energy source is to be locked or tagged out. A copy of these procedures is to be sent to the FM safety manager for review.

8) The removal of a lock or tag by anyone other than the assigned associate who placed the lock or tag on the equipment or machinery is a very serious event and shall be documented with a copy of the documentation being sent to the FM safety manager. The supervisor should make every effort to locate the responsible associate, make a thorough examination of all machinery or equipment protected by the lockout or tagout to ensure that personnel, tools and equipment are clear, and notify the FM manager before removing the lock or tag. Continue to make all reasonable efforts to contact the associate to inform him/her that his/her lockout or tagout device has been removed and to ensure that the associate has this knowledge before he/she resumes work.

9) A tagout device, including the means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment shall meet the following:

- Be able to be affixed by hand.
- Be non-reusable.
- Be self-locking.
- Requires a minimum unlocking strength of 50 pounds.

Note: One device which meets all of these requirements is a one-piece, all environment-tolerant, nylon cable tie.

F) Extras

Cord and plug equipment is exempt from the provisions of this procedure provided that the following two conditions are met.

- Power to the equipment or machine must be completely removed by unplugging.
- The authorized associate must have the plug under his or her exclusive control (i.e. in sight at all times). If not, the plug must be locked out.

An audit shall be performed annually by the FM safety manager to ensure compliance with this written procedure.

This procedure shall be reviewed annually.

Training

All personnel authorized to do maintenance and affected associates (those using or capable of starting a machine or any equipment) shall be trained annually on this procedure.

All new associates shall be properly trained on this procedure before working in an area where lockout or tagout is in use.

Supervisors must document that associate training has been accomplished. Copies of this documentation are to be sent to the FM personnel coordinator and to the FM safety manager.

Documentation must include the names of all associates participating, the date of the training, a copy of the curriculum and the name of the trainer.

To ensure that the necessary information has been learned a written test shall be administered by the trainer and the results recorded. Associates who do not achieve at least a 75 percent score on the written test must be retrained.

Written test results are to be retained by the FM personnel coordinator.

Training should include the following:

- Ensure that all associates know the details of this procedure and that they know what to do and what not to do when they encounter a lock or a tag on a switch or a device they wish to operate.
- Associates must be aware that a tag is not a physical restraint. They must be aware of the false sense of security that tag out systems can present.

Retraining should take place:

- When an associate is re-assigned to a different area or machine.
- When there is a change in the tag and lockout procedure.
- When there is a change in equipment or machinery.
- When a periodic inspection or audit reveals inadequacies in the associate’s knowledge or use of energy control procedures or this energy control program.

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