

Lockout / Tagout Electrical Safety



When working with electricity and lockout/tagout procedures, it is critical to remember that a life is on the line. This training is required by OSHA's Control of Hazardous Energy Standard 29 CFR 1910.147.

In this module, you will learn the:

- Definition and reasons for lockout/tagout.
- Dangers associated with lockout/tagout.
- Ways to safely perform lockout/tagout.

During the module you will answer Quick Quizzes to help you review and test your understanding; these are not scored. There is also a short quiz, in addition to this module, which will be scored. It is necessary to pass with a score of 80% or better to receive credit for this module. This module will take 20 minutes to complete.

/ What is Lockout/Tagout?

Lockout/Tagout is the procedure for a safe shut down and restart of equipment that is serviced, maintained or cleaned. Lockout protects employees who service and maintain equipment and also protects the employees who clean the area by the placement of a lock on a device that will prevent energy from reaching the machine that is being serviced or maintained.



- The lock ensures that the equipment cannot be turned on while the work is occurring.
- Tagout warns employees of the shutdown by the placement of a tag on the energy isolating device which warns others that you are working on the equipment and it must not be started.

/ Why Use Lockout/Tagout Procedures?

Lockout/Tagout procedures prevent equipment from unexpectedly starting up.

If you don't properly lockout/tagout your equipment, it can unexpectedly start-up while you are servicing or maintaining it, resulting in injuries and even death during service and maintenance of equipment and for those involved with industrial cleaning.



/ Why use Lockout/Tagout Procedures?

Many injuries occur when a co-worker starts-up machinery while another employee is still working on it.

Coworkers see machinery unplugged or a switch facing the wrong direction and they think they're doing the right thing by reenergizing the equipment.

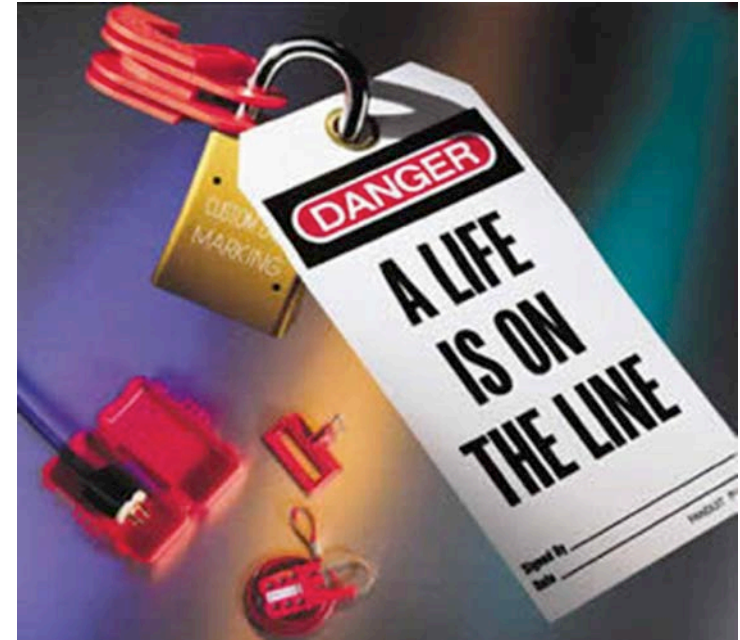
They don't realize that they are placing you in danger. Locking and tagging out machinery will ensure that this doesn't happen.



/ Leading Causes of Lockout/Tagout Injuries

The leading causes of injury are:

- Failure to shut off equipment
- Failure to disconnect from power source
- Unexpected restarting of equipment
- Failure to clear work area before restarting



/ Authorized Employees

Authorized Employees lock or tag machines or equipment in order to perform servicing or maintenance.

Authorized employees must:

- Identify all energy sources.
- Inform others that a lockout/Tagout procedure is in progress.
- Follow all lockout/Tagout procedures.



/ Authorized Employees

As an authorized employee, you are the person who is most at risk of being injured from an unexpected start-up of equipment.

It's your responsibility to recognize all of the dangerous energy sources in the work place, identify their potential hazards and know how to avoid the dangers associated with them.

You must inform all other employees why the equipment is being taken out of service, and for how long (preferably written in advance).



Affected Employees operate or use the equipment that is being serviced or maintained. Affected employees should:

- Understand all Lockout/Tagout procedures so that they don't unintentionally start the equipment.
- Never remove locks or tags that they didn't attach themselves. Removal would place the authorized employee in immediate risk of injury or death.
- Never restart equipment with a lock or tag. Always assume that machines with locks or tags are being serviced or maintained by an authorized employee.

Other Employees don't operate, service, or maintain equipment, but these employees work in the area where these activities occur. They must:

- Be able to identify locks and tags and the associated procedures.
- Avoid equipment when they see it marked as this is the best way to prevent unintentional start-ups.
- Never restart equipment with lock/tag.

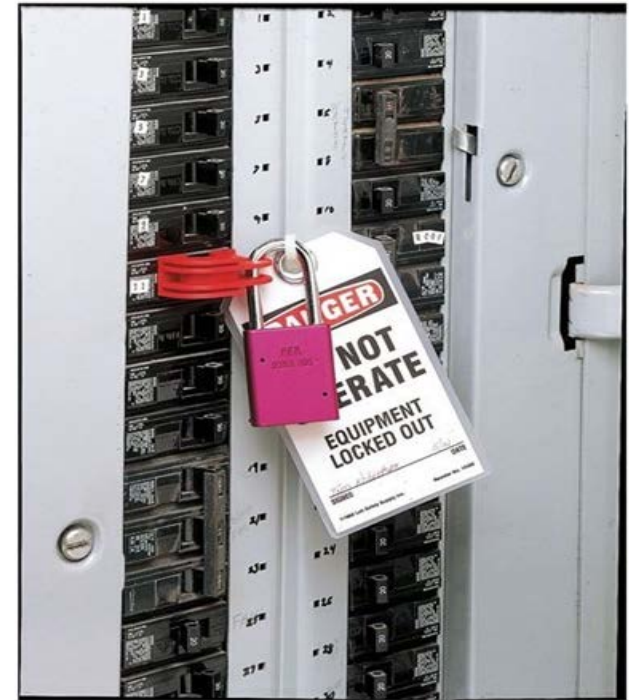
Hardware - A device that is attached to the energy isolating device to physically prevent it from being moved from the OFF position.

Energy Isolating Device – A mechanical device that physically prevents the transmission or release of energy when in the OFF position, such as a gate valve or circuit breaker.

This **DOES NOT** include:

- On/Off switches
- Push buttons
- Control circuit devices

Zero Energy State - All stored or residual energy has been released, restrained or dissipated. Equipment can't be turned on or energized.



There are several types of hazardous energy which can injure an employee. These include, but are not limited to:

- Electrical
- Mechanical
- Chemical
- Thermal
- Hydraulic
- Pneumatic



Electrical energy:

- Is the most common energy type.
- Electrical storage devices such as batteries & capacitors.
- Panelboards house circuit breakers for distribution of electricity.
- Panelboards are also energy isolating devices and provide overcurrent protection.



Electrical energy:

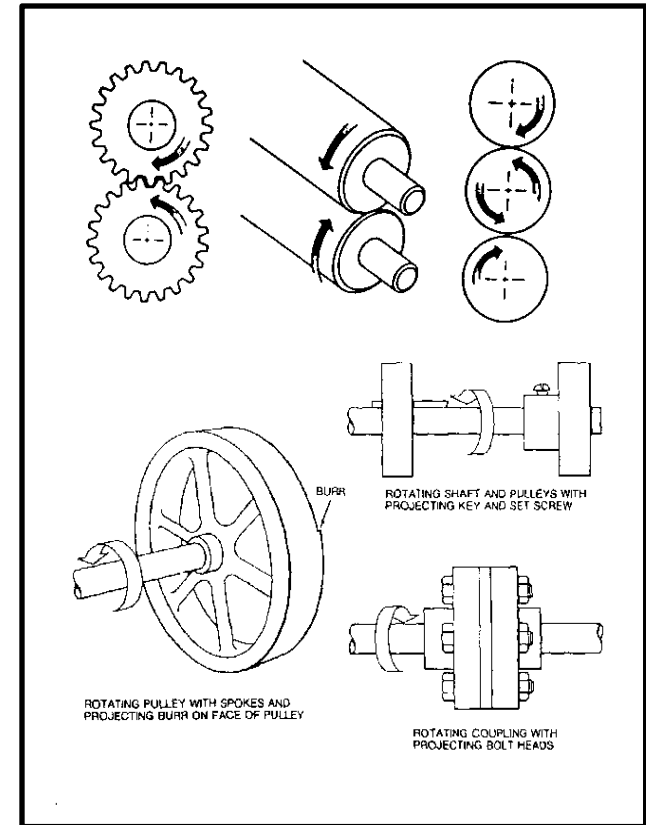
- Disconnects are common electrical energy isolating devices.
- Injuries associated with electrical energy:
 - Electrocution
 - Electric shock
 - Burn



Electrical burn

Mechanical energy:

- Energy is manifested through motion and energy is associated with moving parts of a mechanical system, including:
 - Power transmission apparatus
 - Fly wheels
 - Belts
 - Pulleys
- Contact with moving parts can crush, fracture, cut, or amputate a body part.



Types of Hazardous Energy

Potential energy:

- Is stored energy that can be hazardous if released. Some examples of potential energy include:
 - Gravity
 - Springs
 - Thermal energy
 - Stored energy
 - Capacitors



Pneumatic energy:

Pneumatic lines and vessels can retain energy in the form of stored pressure which may have to be relieved prior to servicing or maintenance.

This may be encountered in:

- Pressurized systems
- Compressors
- House air
- Air powered tools
- Other gases



The Lockout / Tagout Written Program

We have a written procedure, developed to protect employees who perform maintenance on machines, equipment and processes where hazardous energy sources are present.



Step One - Prepare for shutdown.

- Before starting a lockout/tagout procedure, be sure you check what type and how much energy the equipment produces, and review the correct procedures. Notify your co-workers of the shutdown before it occurs. Letting people know ahead of time reduces the chance of an accidental restart.



Step Two - Shutdown equipment.

- Each piece of equipment will have specific directions for shutdown. Don't assume that what works for one piece of equipment will work for all of the others. The energy control procedures will have specific directions for shutdown.

Step Three - Disconnect power source using an energy isolating device.

- Be sure you've identified all energy sources associated with the equipment. Some equipment have multiple energy sources and all must be identified and separately isolated from the equipment.
- An energy-isolating device is capable of being locked-out if it has a locking mechanism built in such as a hasp or can be locked without dismantling, rebuilding or replacing the energy-isolating device.



Step Four - Apply Lockout/Tagout devices

- Only authorized employees can attach locks or tags, and only the specific employee who attached the lock/tag has the authority to remove it.
- Locks ensure that the power source can't be activated. Tags should be used with locks to inform employees of the lock-out and identify the authorized employee who attached the lock.
- Locks must be used if equipment is capable of being locked out.
- If you have equipment that isn't capable of being locked out:
 - Attach the tag in same location where the lock would have been.
 - Attach it securely so it can't be accidentally removed.
 - Place the tag in a position so that anyone attempting to operate the device will understand that moving the device from the "off" position is prohibited.

Step Four - Apply Lockout/Tagout devices (cont.)

Devices must be:

- **Standardized** - Only use locks and tags that have a standardized color, size and shape. The tags are uniform in print and format and must include words such as: “Do Not Start”, “Do Not Open” or “Do Not Operate”.
- **Identifiable** - The locks or tags should be immediately identifiable to anyone attempting to operate the device. Never use another employee’s lockout or tagout device. Each authorized employee should have an individual, identifiable lock and key.
- **Durable** - Lockout devices must only be removable by bolt cutters or like equipment. Both lockout and tagout devices must be capable of withstanding the environment to which they’re exposed.
- **Not used for other purposes** - It’s important not to use lockout/tagout devices for another purpose. Otherwise, someone may become confused and attempt to start equipment that’s being serviced or maintained.

Step Four - Apply Lockout/Tagout devices (cont.)

Limitation of tags:

- **Only a warning device** - Tags are only used as a warning that an energy isolating device has been shut down. They don't provide the protection of a lock.
- **Equipment can still be started-up** - You need to be aware that equipment that's tagged can still be started-up and injure or kill you while servicing or maintaining equipment.
- **False sense of security** - Tags by themselves provide a false sense of security. Tags won't protect you from an accidental start-up. They merely alert people that you're working on the equipment.

Step Five - Release stored energy

- After the lockout/tagout devices have been applied, the authorized employee must ensure that no hazardous energy is still being stored in the equipment. Employees can still be injured or killed by equipment that's shut down if all of the energy is not released.



Step Six - Verify machine is safe

- Prior to starting work on equipment that has been locked out or tagged out, the authorized employee must verify that the machine is safe. The employee should turn all controls to the “on” position to ensure that the machine will not start-up.
- If any power source activates after the procedure is complete, you must perform all six steps over again. Any energy can kill you.

- **Inspect work area** - Before a complete restart of the affected equipment, the work area must be inspected.
- **Notify employees** - Before you remove devices, alert others in the area, make sure they're out of the way, then let them know when it's safe to return.
- **Remove devices** - The authorized employee should verify it's safe to reenergize the equipment. They must ensure that tools, spare parts, and debris have been removed from the area, safety guards replaced and equipment is in the same condition as before the procedure. The only person who can remove a device is the person who attached it. If it isn't yours, don't touch it.
- **Test equipment** - If equipment that's being locked or tagged out must be tested, follow the same procedures for restarting equipment, test the equipment and then perform the six lockout/tagout steps.

A group lockout situation occurs when more than one person must service or maintain a piece of equipment.

- Each employee **must attach their own lock or tag to a group lockout device** when they're working on the equipment. This assures that the equipment won't be started up while they're working on it.
- If there are shift or personnel changes, a group lockout device is used. **The outgoing employee must wait until the incoming employee attaches their lock or tag before removing their own.** This process ensures that there's always one primary person responsible for the lockout/tagout procedure.



In most cases, **never remove a lock or tag that another employee has attached**. If equipment that is being serviced needs to be used and the employee who attached the lock or tag cannot be found:

- Verify employee who attached the lock or tag is not in the facility.
- Make a reasonable effort to contact employee.
- **If you still can't contact the employee, remove the lock or tag using the proper procedures and inform the employee about the removal when he or she returns.** This is to make sure they don't attempt to service the equipment without locks or tags attached to the energy isolating device.

- Lockout/Tagout is a warning and prevention system that protects employees by placing a lock on a device to isolate the energy from the machine that's being serviced or maintained.
- Equipment that isn't properly locked/tagged can unexpectedly restart while you are servicing it. This accidental start-up can cause serious injury or death.
- Know the six steps of Lockout/Tagout:
 1. Prepare for shutdown
 2. Shutdown the equipment
 3. Disconnect power source using an energy isolating device
 4. Apply lockout/tagout devices
 5. Release stored energy
 6. Verify machine is safe
- Never remove another employee's lock/tag because it places them in danger.

/ ATALIAN. For a better performance

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