

Lockout-Tagout (LOTO) or lock and tag is a safety procedure which is used in industry 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. It requires that hazardous energy sources be "isolated and rendered inoperative" before work is started on the equipment

Overview

- **Hazardous Energy:**

Energy sources including electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other sources in machines and equipment can be hazardous to workers. During the servicing and maintenance of machines and equipment, the unexpected startup or release of stored energy can result in serious injury or death to workers.

- **Lockout Devices:**

Lockout devices are devices that use a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

- **Tagout Devices:**

An authorized employee attaches warning tags to the energy-isolation devices (for the deactivated energy sources) to indicate that the energy-isolation devices and the equipment being controlled may not be activated until the tags are removed. Tagout should be used in combination with lockout.

The standard applies to all sources of potentially hazardous energy, such as electrical, mechanical, hydraulic, pneumatic, chemical, thermal energy, and other sources.



Case Studies

A) A cotton gin operator climbed into a jammed cotton cleaner/separator to clear a jam. The toggle switch controlling the operation of the gin was turned off but not locked out. For reasons unknown, a fellow worker turned the machine back on, not realizing the operator was inside the gin. The operators left leg was pulled through the feed rollers.

- Disconnecting the power source and lockout the machine could have avoided the incident.

B) Three employees of the Tamil Nadu electricity board had climbed a tower at the sub-station, as part of daily maintenance and were suddenly thrown to the ground, due to passage of electricity. One employee was electrocuted while two others sustained burn injuries, they were carrying out maintenance work at Thudiyalur sub-station in Oct 2016.

- Isolating and tagging the equipment under maintenance from power source could have avoided the incident.

Safety Tips

When you write your LOTO procedures, make sure to identify all sources of potentially hazardous energy, including:

- Mechanical energy. Energy created by a machine's moving parts, like wheels, springs, or elevated parts.
- Hydraulic energy. The energy of pressurized, moving liquids, usually water or oil, in accumulators or lines.
- Pneumatic energy. The energy of pressurized, moving gas, as found in air in tanks and lines.
- Chemical energy. Energy created by a chemical reaction between two or more substances.
- Thermal energy. Heat energy; most commonly, steam energy.
- Stored energy. Energy stored in batteries and capacitors.

STEPS TO FOLLOW:

- Identify energy sources and shut off energy to the affected equipment.
- Notify affected employees and site supervisor.
- Shutdown and Isolate the equipment from energy source(s).
- Place locks and tags to each energy source controlling device.
- Verify that all stored energy is released from capacitor banks, springs, compressed air, steam, hydraulics, etc.
- Perform the desired maintenance work
- Check area to ensure that all affected employees are safely positioned or removed from the area.
- Notify all affected employees and site supervisor before reenergizing the equipment.
- Remove lockout/tagout devices.
- Reenergize equipment to ensure safe operation.



Employee Training

The content of an organization's training program depends on which employee is being trained. There are two types of employees who need to receive training: Authorized and Affected.

A. Authorized employees are those locking out the equipment and performing service and maintenance. Training for authorized employees includes:

- Details about the types of hazards
- The magnitude of hazardous energy sources
- Methods to isolate and control energy sources

B. Affected employees include those whose job requires them to operate a machine on which servicing is being performed. Affected employees do not perform LOTO, but they should have an awareness level of LOTO and be able to recognize when lockout procedures are being used. An understanding of why the affected employee should not start up the equipment that is locked out is important to cover.