



## 1. Introduction

This manual outlines the procedures for safely isolating energy sources from electrical, mechanical, valve, and panel equipment during maintenance, repair, or servicing activities. The purpose of these Lockout/Tagout (LOTO) procedures is to prevent the accidental release of hazardous energy and protect employees from potential harm.

## 2. Scope

This procedure applies to all employees involved in the maintenance, servicing, or repair of electrical, mechanical, valve, and panel systems across the organization. This includes equipment powered by electrical energy, mechanical devices, fluid power systems (e.g., hydraulics, pneumatics), and electrical or manual control panels.

## 3. Definitions

**Lockout:** The use of a lockout device to isolate or de-energize equipment, preventing its operation.

**Tagout:** The use of a tagout device to indicate that equipment should not be operated until the tagout device is removed.

**Energy-Isolating Device:** A device that physically prevents the release of energy (e.g., a switch, valve, or circuit breaker).

**Authorized Employee:** An employee who is trained and authorized to perform lockout/tagout procedures.

**Affected Employee:** An employee who operates or works near equipment that could be affected by lockout/tagout procedures.

**Stored Energy:** Energy that remains in a system even after it has been shut down, such as compressed air, hydraulic pressure, or electrical energy in capacitors.

## 4. Responsibilities

### **Employer/Management:**

Ensure LOTO procedures are implemented, monitored, and followed.  
Provide the necessary equipment and training.

### **Authorized Employees:**

Follow LOTO procedures for energy isolation and system verification.  
Ensure all energy sources are properly isolated before starting work.

### **Affected Employees:**

Understand LOTO procedures and remain clear of isolated systems.

## 5. Lockout/Tagout Procedures

### **General Steps (for all types of equipment):**

- Preparation
- Identify and review all equipment and energy sources (e.g., electrical, mechanical, hydraulic, pneumatic, etc.).
- Notify affected employees of the planned maintenance.
- Shutdown
- Shut down the equipment using standard operational procedures, ensuring normal controls (e.g., switches, buttons) are turned off.
- Isolation
- Identify and isolate energy sources using energy-isolating devices such as:
  - Electrical: Circuit breakers, disconnect switches, fuses, or locks on plugs.
  - Mechanical: Valve handles, clutch levers, or mechanical stops.
  - Valve Systems: Manual shut-off valves, double-block and bleed systems.
  - Panels: Disconnects, control panel switches, or breakers.
- Lockout/Tagout
- Apply lockout devices to the energy-isolating devices. Use appropriate locks and keys to ensure only authorized employees can unlock them.
- Attach tagout devices to indicate that the equipment is under maintenance and should not be operated.

- Stored Energy
- Ensure all residual or stored energy (e.g., hydraulic pressure, compressed air, electrical charges) is safely released or dissipated.
- Electrical: Discharge capacitors, lock out backup power supplies.
- Mechanical: Release springs, check for flywheel energy.
- Hydraulic/Pneumatic: Drain lines, relieve pressure from tanks.
- Verification
- Before beginning maintenance, verify that the system is properly de-energized by attempting to operate equipment or using testing devices (e.g., voltage testers, pressure gauges).

## 6. Lockout/Tagout Procedures for Specific Equipment Types

- Electrical Equipment:
  - Preparation: Identify all electrical panels and circuits connected to the equipment.
  - Isolation: Use the electrical panel's circuit breaker or disconnect switch to isolate power.
  - Lockout/Tagout: Apply a lock to the breaker or switch and place a tag indicating maintenance is in progress.
  - Verification: Use a voltage tester to confirm no live current is present.
- Mechanical Equipment:
  - Preparation: Identify all sources of mechanical energy (e.g., rotating parts, flywheels, springs).
  - Isolation: Secure all mechanical energy sources, including clutches, brakes, and disconnecting power to drives.
  - Lockout/Tagout: Lock out clutches, disconnect power supplies, and tag the equipment for safety.
  - Verification: Ensure that all moving parts are securely stopped and locked in place.
- Valve Systems:
  - Preparation: Identify valves controlling hazardous fluids (e.g., gas, liquids, steam) and the associated equipment.
  - Isolation: Close all relevant valves and, if necessary, apply additional

isolation devices such as blinds or valve locks.

- Lockout/Tagout: Place locks on valve handles or use valve lockout devices.
- Verification: Confirm that the system is fully isolated by attempting to operate or open valves.
- Panels and Control Systems:
- Preparation: Identify all panel systems and control devices that regulate the equipment.
- Isolation: Disconnect the panel or use isolation switches on the control panel.
- Lockout/Tagout: Lock the main power supply or use a lockout device for the panel's disconnect switch.
- Verification: Confirm that the panel cannot be operated by attempting to activate the controls.

## 7. Removing Lockout/Tagout Devices

Ensure that all tools and maintenance equipment are removed from the work area.

Verify that all employees are safely away from the equipment.

Remove the lockout/tagout devices only after confirming that it is safe to do so and that the equipment is ready to be returned to service.

## 8. Training and Communication

**Initial Training:** All authorized employees must undergo initial training on the LOTO procedure.

**Ongoing Training:** Provide refresher training at least annually or when new equipment is introduced.

**Communication:** Regularly communicate the importance of lockout/tagout and reinforce the procedures to all affected employees.

## **9. Record keeping and Audits**

Maintain records of LOTO procedures, including who performed the lockout/tagout, which equipment was involved, and the work performed. Conduct regular audits and inspections of LOTO procedures to ensure compliance and identify areas for improvement.

## **10. Emergency Procedures**

In case of emergency, all employees must know how to safely remove themselves from the vicinity of hazardous energy sources and notify authorized personnel to reinitiate LOTO procedures.

