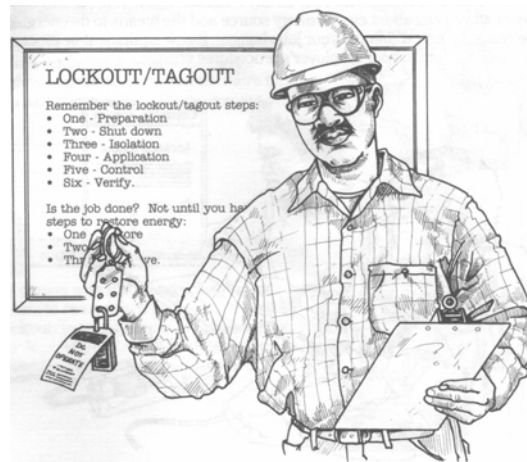




LOCKOUT/TAGOUT

NPC TRAINING PROGRAM

STUDENT HANDOUT



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COURSE OBJECTIVES

Course Objective

The objectives for this course are:

- What Lockout/Tagout is
- When to perform Lockout/Tagout
- The 6 steps for controlling sources of energy
- The 3 steps for safely restoring energy when work is done

LOCKOUT/TAGOUT

Definition of Lockout/Tagout

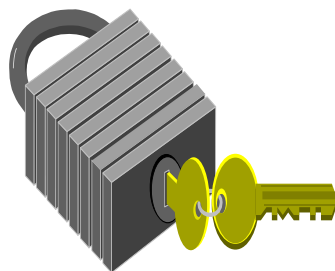
Lockout is a technique used to prevent equipment from being accidentally started and stored energy from being released while an associated machine or piece of equipment is being serviced.

A padlock or any other appropriate mechanical device that physically prevents the transmission or release of energy is placed on the energy-isolating device that should be in the off or closed position.

Energy-isolating devices can be:

- Disconnect switches
- Circuit breakers
- Valve handles

A tag also will be placed together with the locking device, to explain why the equipment is locked, by whom and for how long.



The use of only tags, without locks, is acceptable if additional measures to protect equipment are put in place. For example:

- Removal of the circuit-isolating element
- Removal the valve handle
- Blockage of a controlling device

The ultimate goal of lockout/tagout is to protect the safety and health of employees. Secondary is the protection of equipment from damage.

Types of Lockout Devices:

- Disconnect switches
- Slide gates
- Valves (ball, gate, etc.)
- Blocks
- Blind flanges

Colour Code for Locks and Tags:

◆ Locks:

- **Blue locks** - equipment locks - used to protect equipment.
- **Red locks** - used for Personal Protection.
- **Green locks** - given to contractors to use on equipment.
- **Orange Locks** - control a group lockout. Locks out many pieces of equipment with only one locking device.

◆ Tags:

- **Red tags with Red locks** - used for personal protection of employees.
- **Red tags with Green locks** – used for contractor protection.
- **Yellow tags with Blue locks** – used for protection of equipment.
- **Yellow tags without a lock** – non-energized equipment out of service. The tag will tell what is wrong with the equipment.



Typical Lockout/Tagout for equipment protection



Typical Lockout/Tagout for personal protection



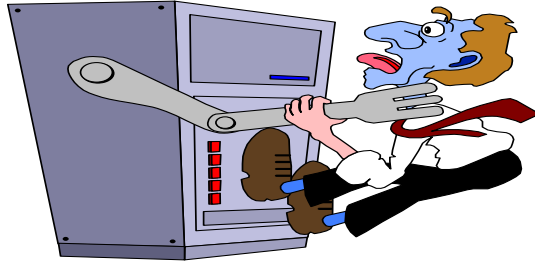
Typical Lockout/Tagout for contractor and personal protection



Yellow Tag without a Lock non-energized equipment out of service

The 5 Main Causes of Fatal Lockout/Tagout Injuries:

1. Failure to stop equipment
2. Failure to disconnect from power source
3. Failure to dissipate (bleed, neutralize) residual energy
4. Accidental restarting of equipment
5. Failure to clear work areas before restarting



Hazardous Energy Sources

Hazardous energy comes in many forms. On some types of equipment, more than one form may be present and all must be locked out/tagged out before work begins. The most common types of hazardous energy are:

- Electrical:
 - Generated
 - Static
- Mechanical:
 - Transitional
 - Rotational
- Thermal:
 - Machines or Equipment
 - Gas, water, steam
 - Chemical Reactions
- Potential (stored energy):
 - Pressure
 - Hydraulic – fluids under pressure
 - Pneumatic – air under pressure
 - Vacuum
 - Springs
 - Capacitors
 - Gravity

Lockout Procedure:

1. **Preparation for Shutdown** – study the equipment and the source(s) of energy before tagging/locking it. Alert the operator (s) that power is going to be disconnected.
2. **Equipment Shutdown**
3. **Equipment Isolation** – find and isolate every form of energy that the machine uses.
4. **Application of Lockout Devices** – apply lock and/or tags to all energy isolating equipment. Anything that might restore the flow of energy to the work area must be locked out.
5. **Control of Stored Energy** – after locking out/tagging out the equipment, the stored energy must be controlled by:
 - Relieving any residual energy
 - Waiting until moving parts stop
 - Relieving trapped pressure
 - Installing ground wires to discharge electrical capacitors
 - Blocking or supporting elevated equipment
6. **Verify Equipment Isolation** – before starting the work, check once more if all the equipment is locked out/tagged out and free from stored energy.

Removal of Lockout:

1. **Restore Serviced Equipment:**
 - Remove all tools
 - Ensure all equipment components are securely in place
 - Re-attach all safety features (guards)
 - Close serviced equipment
 - Ensure equipment is safe to operate
2. **Notify Personnel** – that lockout/tagout devices are going to be removed
3. **Remove lockout/tagout devices** – only the person who placed each lockout/tagout device is authorized to remove them.

Reactivating Equipment:

1. Wait until the last lockout/tagout device is removed
2. Gather all workers involved in the operation in a safe place, to ensure nobody is still working in the area
3. Tell workers the equipment is going to be re-energized
4. Re-energize the equipment

Follow Up:

1. Report any problems found with the lockout/tagout procedure to your supervisor
2. Share this information with workers who were involved in the operation