

27 LOCKOUT AND TAGGING



Lockout and tagging ensures that hazardous energy sources are under the control of each worker. Serious or fatal accidents can occur when people assume that machinery is turned off or made harmless—but it isn't.

Lockout is a procedure that prevents the release of hazardous energy. It often involves workers using a padlock to keep a switch in the "off" position, or to isolate the energy of moving parts. This prevents electric shock, sudden movement of components, chemical combustion, falling counterweights, and other actions that can endanger lives. Lockout is a physical way to ensure that the energy source is de-energized, deactivated, or otherwise inoperable.

Tagging tells others that the device is locked out, who has locked it out, and why. Tagged devices and systems must not be re-energized without the authority of those named on the tag.

Forms of Energy

When most people think of uncontrolled hazardous energy, they think of electricity. But construction crews doing work in industrial or office settings often have to lock out and tag a variety of energy sources. Here are the main types.

- **Electrical**—electrical panels, generators, lighting systems, etc.
- **Mechanical** (the energy of moving parts)—flywheels, blades, fans, conveyor belts, etc.
- **Potential** (stored energy that can be released during work)—suspended loads, compressed air, electrical capacitors, accumulated bulk goods, coiled springs, chemical reactions, changing states (solid—liquid—gas), etc.
- **Hydraulic**—presses, rams, cylinders, cranes, forklifts, etc.
- **Pneumatic**—lines, compression tanks, tools, etc.
- **Thermal**—steam, hot water, fire, etc.
- **Chemical**—flammable materials, corrosive substances, vapours, etc.

Some equipment may involve more than one type of energy, and pose unexpected hazards. For example, a machine may have an electrically operated component with a hydraulic or pneumatic primary power source, or it may become activated on a timed schedule. With some equipment, gravity and momentum can present unexpected hazards.

You must recognize and control conditions such as these. Switches, power sources, controls, interlocks, pneumatics, hydraulics, computer-controlled sources, gravity-operated sources—all of these must be locked out and appropriately tagged by each worker involved.

Know the law

Section 190 of the Construction Regulation (O. Reg. 213/91) lists the requirements for lockout and tagging, including the requirement that the employer shall establish and implement written measures and procedures to ensure that workers are adequately protected from electrical shock and burn and make a copy of the written measures and procedures available to every worker on the project.

Written Procedures

Many plants or industrial establishments will have specific procedures for lockout and tagging. This makes sense because the in-plant workforce will have proven its procedures through use on the particular system or machine in question.

Follow these procedures, but also verify that all energy sources have been isolated because construction work may differ from routine plant maintenance.

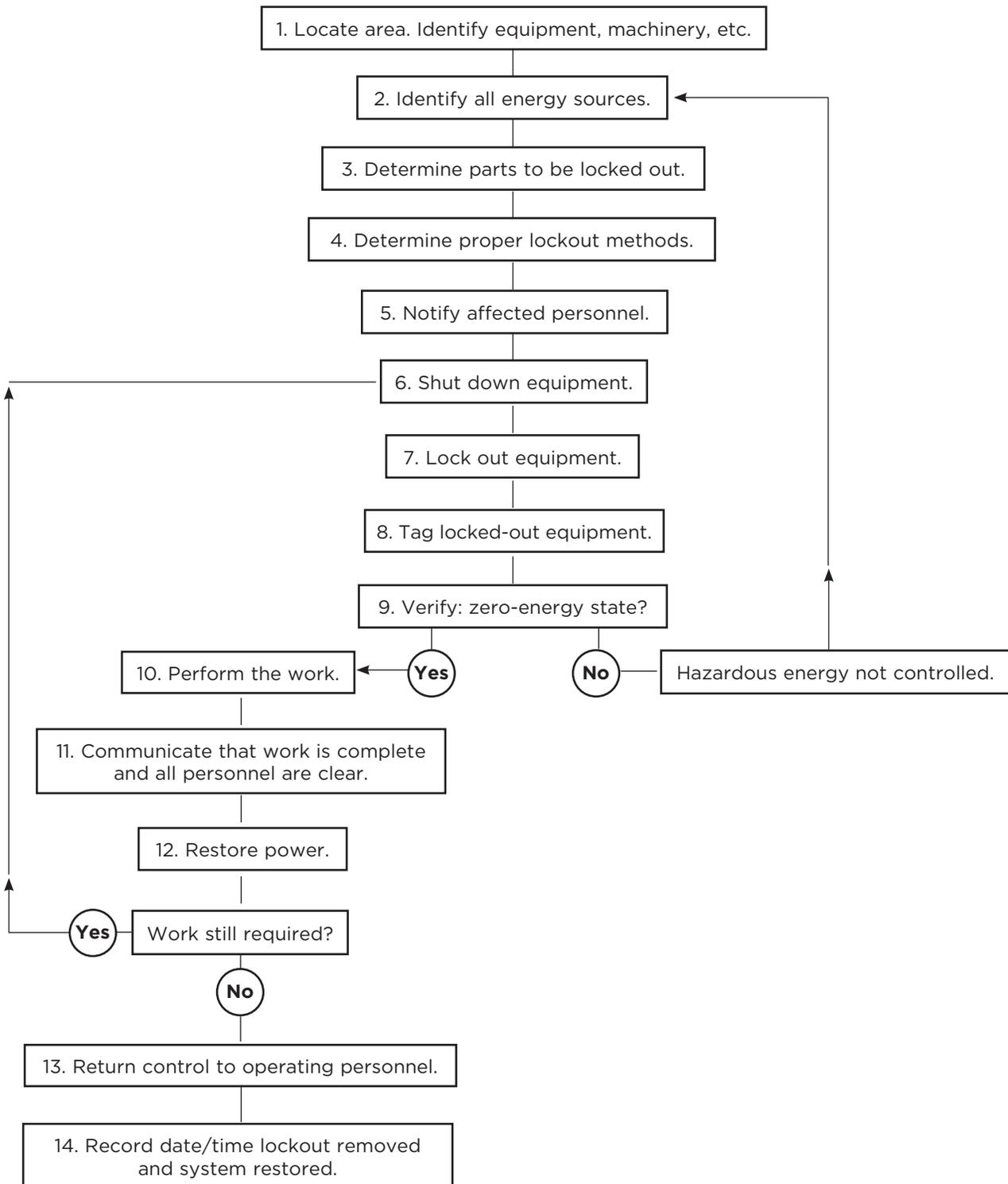
Plant personnel may shut down machines, equipment, or processes. In other cases, plant representatives may issue permits:

- 1) a work permit to allow work on their equipment
- 2) a lockout permit to ensure that all lockout procedures are followed before work begins.

A written safe work procedure for lockout and tagging is essential. Once implemented and followed, a good procedure ensures that no form of energy can harm anyone during a lockout.

Planning Steps

Specific lockout procedures will vary depending on the work and the processes which must be shut down. The following chart can help you develop specific procedures.



A written procedure helps to ensure that lockout and tagging have been thoroughly and effectively carried out before work begins. It should include the following.

- Training requirements for workers and supervisors
- The quality, type, and colour of locks, scissors, chains, blanks, blinds, and other lockout devices
- A method of identifying lock owners
- Control of keys for locks
- The colour, shape, size, and material for tags
- A method of securing tags and information to be included
- Communication and authorization procedures for shutting down and starting up machinery and equipment
- Record-keeping requirements
- Itemized steps to meet lockout objectives.

Planning Steps

STEP 1: Locate Work Area and Identify Equipment, Machinery, or Other System Components To Be Worked On

Identify the area with references such as floor, room name, elevation, or column number. Identify the equipment that is the subject of the work.

STEP 2: Identify All Energy Sources

Identify all energy sources affecting the equipment or machinery. Identify the various energy forms to be locked out such as electrical, momentum, pneumatic, hydraulic, steam, and gravity.

STEP 3: Identify The Parts To Be Locked Out or Isolated

Identify systems that affect, or are affected by, the work being performed. These may include primary, secondary, backup, or emergency systems and interlocked remote equipment.

Review the current system drawings for remote energy sources and, where required, identify and confirm with the client or owner the existence and location of any switches, power sources, controls, interlocks, or other devices necessary to isolate the system.

Remember that equipment may also be affected by

- time restrictions for completing the work
- time-activated devices.

STEP 4: Determine Lockout Methods

Confirm that the lockout of all energy sources is possible. Some equipment may have to be kept operational to maintain service to other equipment that cannot be shut down.

Take appropriate steps to provide protection for workers while working near operating equipment.

Equipment that can be locked out should be locked out by the methods most appropriate to the hazards.

STEP 5: Notify All Personnel Affected

Shutting down equipment may affect operations in other locations, incoming shifts, or other trades who may be planning to operate the locked-out system. Before proceeding with the lockout, inform all personnel who will be affected.

At construction sites with a large workforce or at relatively large factories, you may need to have special communication methods and permits or approvals.

STEP 6: Shut Down Equipment and Machinery

Qualified personnel must shut down the equipment, machinery, or other system components, placing them in a zero-energy state. Trace all systems to locate and lock out energy sources. The main source may be electrical, for instance, but pneumatic and other forms of energy may also be present. Always look for other possible energy sources.

All equipment capable of being energized or activated electrically, pneumatically, or hydraulically must be de-energized or de-activated by physically disconnecting or otherwise making the apparatus inoperable.

Always ensure that the client and operators are aware of the plan to shut down and lock out equipment, machinery, or other system components. In some cases, operations personnel or equipment operators may be required to shut down components because of their special qualifications or knowledge of the system.

In determining what needs to be shut down and locked out, consider the different energy sources that may be found in the system.

STEP 7: Install Lockout Devices

After the circuit has been de-energized and locked out by the person in charge, each worker involved in the lockout must be protected by placing his or her personal lock on the isolating device.

Remember—even though the disconnect is already locked out, you are not protected until you attach your own personal safety lock.

Each worker must retain his or her key while the lock is in place. Only the worker in charge of the lock should have a key.

Locks

Locks should be high-quality pin-type, key-operated, and numbered to identify users (Figure 27-1).

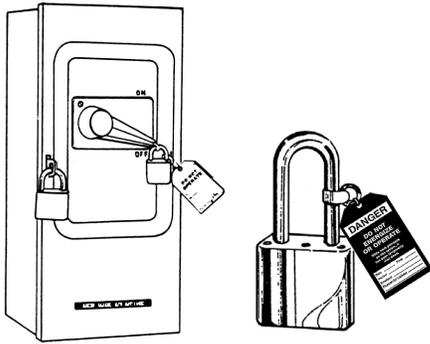


Figure 27-1: Lockout Devices

Multiple locks and lockout bars

When several workers or trades are working on a machine, you can add additional locks by using a lockout bar or multi-lock adapter (Figure 27-2). You can add any number of locks by inserting another lockout bar into the last hole of the previous bar.

Figure - Don't forget lockout and tagging
Safe Methods for Machine Guarding



Figure 27-2: Multi-lock Adapter

Other lockout devices

Scissors—have holes for locks and should be made of hardened steel (Figure 27-3).



Figure 27-3: Scissors

Chains—should be high quality and snug fitting (Figure 27-4).

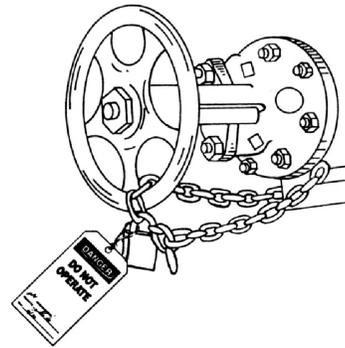


Figure 27-4: Chain

Blocks or cribbing—prevent or restrict movement of parts.

Blanks or blinds—are solid metal plates inserted at flanged connections to prevent the flow of liquids or gases (Figure 27-5).

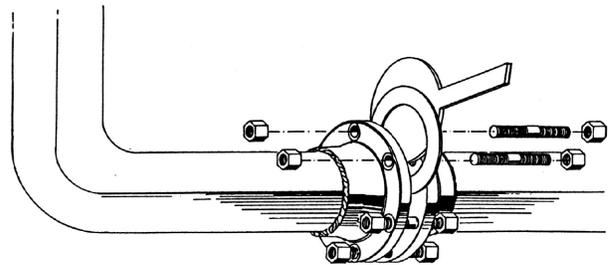


Figure 27-5: Blank or Blind

Pins and clamps—should be of high-quality materials and designed to fit the system.

Remember . . .

- Merely removing a fuse doesn't constitute lockout. The fuse could be easily replaced. The fuse should be removed and the box locked out.
- The lockout devices attached to one system should not prevent access to the controls and energy-isolating devices of another system.

STEP 8: Tagging

Section 190 of the Construction Regulation (O. Reg. 213/91) requires each worker involved in a lockout operation to attach a tag made of non-conducting material in a conspicuous location and secure it to prevent inadvertent removal. The tag must identify the worker's name, the worker's employer, the date of lockout, and the reason for the lockout.

A tag in itself offers no guarantee that a machine or system is locked out. It simply provides information (Figure 27-6).

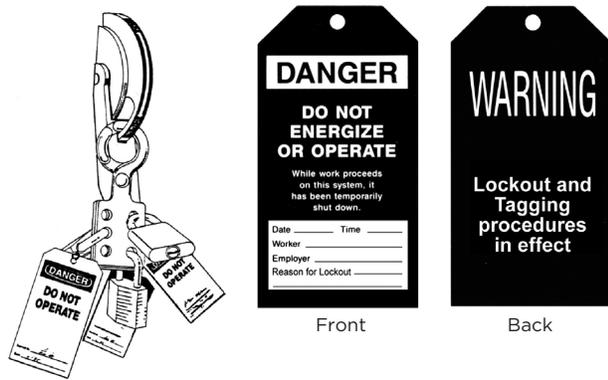


Figure 27-6: Tags

Signs must be placed on the system indicating that

- it must not be energized or operated
- guards, locks, temporary ground cables, chains, tags, and other safeguards must not be tampered with or removed until
 - a) the work is complete, and
 - b) each worker has removed his or her personal lock.

A record must be kept of all equipment locked out or otherwise rendered inoperable so that all of these devices can be reactivated once the work is complete.

STEP 9: Verify Zero-Energy State

After any power or product remaining in the equipment has been discharged or disconnected by qualified personnel, verify that all personnel are clear of the equipment. Then try, with extreme caution, to start the equipment manually. Look for any movement or functions. If none are observed, confirm that all energy sources are at a zero-energy state.

Test the system to ensure that all electrical components are de-energized and de-activated, including interlocking and dependent systems that could feed into the system, either mechanically or electrically.

STEP 10: Perform the Task

Carry out and complete the work assignment.

STEP 11: Communicate That Work Is Complete and That All Personnel Are Clear

- Ensure that personnel are clear of the locked-out equipment, machinery, or system.
- Remove only **your** tags and locks.
- Tell personnel that were originally informed of the lockout that the equipment, machinery, or system is no longer locked out.

STEP 12: Restore Power

Return systems to operational status and the switches to power ON. Have qualified personnel restart machinery or equipment.

STEP 13: Return Control to Operating Personnel

When all work is completed, the person in charge of the lockout operation should formally return control of the equipment or system to plant personnel.

STEP 14: Record Date/Time Lockout Removed and System Restored

This last step is important. It saves valuable information that may be lost if not recorded. Staff involved in the shutdown may not remain at the same jobsite. Owners or operators may require this information to help plan future shutdowns.

Summary

Lockout can ensure the safety of a single mechanic working alone or of hundreds of workers in a factory. In either situation, a procedure for safe lockout and tagging must be written, implemented, and followed step by step.

Lockout and tagging procedures help to ensure that

- all energy sources are identified and locked out
- energy is not inadvertently restored while work is proceeding
- maintenance, repair, installation, and other jobs can be carried out safely
- records are kept.

IHSA has a pocket-sized booklet available that outlines step-by-step methods and procedures for de-energizing equipment, machines, and devices. *The Pocket Lockout Guide* (B011) was developed for the Aggregates sector, but it can be used by any industry to help them meet the legal requirements for written procedures to control sources of hazardous energy. Visit the **Products** section of the ihsa.ca website to order a copy.

