



## A Health and Safety Guideline for Your Workplace

# Lockout

### What is a lockout?

“Lockout” means to physically neutralize all energies in a piece of equipment before beginning any maintenance or repair work.

Lockouts generally involve:

- z stopping all energy flows (for example, by turning off switches, or valves on supply lines);
- z locking switches and valves;
- z securing the machine, device, or power transmission line in a de-energized state (for example, by applying blocks or blanks, or bleeding hydraulic or pneumatic pressure from lines).

### Why is a lockout necessary?

If a lockout is not performed, uncontrolled energies could cause:

- z electrocution (contact with live circuits);
- z cuts, bruises, crushing, amputations, death, resulting from:
  - entanglement with belts, chains, conveyors, rollers, shafts, impellers;
  - entrapment by bulk materials from bins, silos or hoppers;
  - drowning in liquids in vats or tanks;
- z burns (contact with hot parts, materials, or equipment such as furnaces);
- z fires and explosions;
- z chemical exposures (gases or liquids released from pipelines).

Often power sources are inadvertently turned on, or valves opened mistakenly before the work is completed, resulting in serious injuries and fatalities. Therefore, it is important not only to ensure that all energies are properly locked out, but also that they remain locked out until the work is completed.

### How is a lockout done?

For lockouts to be effective, a clear, well-defined lockout policy supported by administrative and control procedures, and proper training, is essential. A systematic approach would be to:

- z develop a lockout policy;
- z identify lockout situations;
- z develop procedures;
- z train workers; and
- z enforce and update your policy.

### Develop a lockout policy

Your written lockout policy should make reference to your company’s general occupational health and safety policy. It should clearly outline responsibilities, and refer to procedures to be followed. It should state your company’s intent to protect all employees by:

- z identifying all activities and machines, equipment, and processes which require lockouts (for example, repairs, maintenance, and cleaning of pipelines, tanks, and machines);

- z making the appropriate persons responsible for lockouts;
- z ensuring that lockouts are performed by authorized persons only;
- z developing procedures for each specific lockout situation;
- z training those who will perform lockouts;
- z verifying the effectiveness of such training;
- z reviewing, updating, and enforcing the lockout policy.

### Identify lockout situations

Assess all processes, machinery, energies, and work activities to identify where and when lockouts are needed. Maintenance work will probably be the major focus of lockout needs. A useful source of information may be workplace inspections, and recommendations from your joint health and safety committee or health and safety representative.

List every machine, device, or process that will require a lockout. Against each, list the energy forms involved. Different energy forms will require different procedures. More than one lockout may be required for a single machine or system.

### Develop procedures

Procedures should be in writing and communicated to all employees and departments. Administrative procedures for lockouts in general should include the following:

- z supervisors to be notified of lockouts in their areas;
- z all lockouts to be authorized by a work permit;
- z lockout to stay in effect if work is not completed at the end of the shift;
- z completed work to be reported to the person in charge for signing off the work permit.

Control procedures involve developing separate, detailed, written lockout procedures for each identified machine, device or process that may require to be locked out at some time. The procedure should identify:

- z the person responsible for performing the lockout (for example, operator, millwright, electrician);
- z the person responsible for ensuring that the lockout is properly performed (for example, maintenance supervisor and/or site supervisor);
- z the energy sources to be controlled by the lockout;
- z the location of control panels, power sources (including electrical power boxes), switches, interlocks, valves, blocking points, relief valves and/or blanking and bleeding points (review schematics);
- z special hazards (for example, a flywheel that spins for minutes after power is removed, electrical capacitors);
- z the personal protective equipment that must be used or worn (for example, eye protection, electrically insulated foot protection);
- z the step by step lockout procedure (that is, who does what, and when);
- z the testing procedure to ensure that all energy sources are controlled;
- z the step by step procedure for removing the lockout.

See Figure 1 for a list of energy forms and their sources. The brief general lockout guideline for each energy form will form the basis for your detailed control procedures.

Figure 1

**Energy forms, energy sources, and general lockout guidelines**

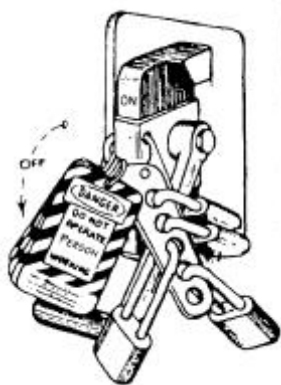
ENERGY FORM	ENERGY SOURCE	GENERAL LOCKOUT GUIDELINE
<p><b>Electricity</b></p>	<p>power transmission lines; machine power cords; motors; solenoids; capacitors (stored electrical energy)</p>	<p>turn off power at machine first (i.e., at point of operation switch), and then at the main disconnect switch for the machine; lock and tag main disconnect switch (or remove fuses from box, and then lock and tag box).</p> <p>fully discharge all capacitative systems (e.g., cycle machine to drain power from capacitors) according to manufacturer’s instructions.</p>
<p><b>Fluid pressure</b></p>	<p>hydraulic systems (e.g., hydraulic presses, rams, cylinders, hammers)</p>	<p>shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves; bleed off and blank lines as necessary.</p>
<p><b>Air pressure</b></p>	<p>pneumatic systems (e.g., lines, pressure reservoirs, accumulators, air surge tanks, rams, cylinders)</p>	<p>shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves; bleed off excess air; if pressure cannot be relieved, block any possible movement of machinery.</p>
<p><b>Kinetic energy</b> (energy of a moving object or materials – moving object may be powered or coasting)</p>	<p>blades; flywheels; materials in supply lines of bins or silos</p>	<p>stop and block machine parts (e.g., stop flywheels and ensure that they do not recycle); review entire cycle of mechanical motion, ensure that all motions are stopped.</p> <p>block material from moving into area of work; blank as required.</p>
<p><b>Potential energy</b> (stored energy that an object has the potential to release due to its position)</p>	<p>springs (e.g., in air brake cylinders); actuators; counter weights; raised loads; top or movable part of a press or lifting device</p>	<p>if possible, lower all suspended parts and loads to the lowers (rest) position, block parts that might be moved by gravity; release or block spring energy.</p>
<p><b>Pressurized liquids and gases</b> (including steam, chemicals)</p>	<p>supply lines; storage tanks and vessels</p>	<p>shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves; bleed off excess liquids or gases; blank lines as necessary.</p>

Issue sturdy, key-operated padlocks to workers who service or maintain equipment. The worker's name and clock number should be stamped on the lock, or on an identification tag securely attached to the lock. Each worker should be issued with only one key.

It is important that, for their personal protection, each worker and/or foreperson working in or on a machine places his/her own safety lock on the disconnect switch. Use tags to spotlight work in progress and give details of work being done (see Figure 2). Only when the work is completed and the work permit signed off, may each worker remove his/her lock. The last lock to be removed should be that of the person supervising the lockout. This lock should be removed only by the person in charge, and this responsibility should **not** be delegated.

**Figure 2**

**A locked out and tagged disconnect switch**



## Train your workers

All workers performing lockouts and their supervisors must receive training. The training should address:

- z importance of lockouts;
- z legal requirements for lockouts;
- z company policy on lockouts;
- z the energy forms, hazards and procedures (administrative and work-related) that must be followed;
- z the importance of following procedures;
- z lockout errors to be avoided (for example, assuming the equipment is inoperable or that the job is too small to warrant a lockout);
- z the use and care of personal protective equipment;
- z proper use of all tools.

Test employees by having them perform mock lockouts. Provide refresher training at least quarterly.

## Enforce and update your lockout policy

Identify persons responsible for ensuring lockouts are properly followed and hold them accountable. The best way to do this is to include this in their job descriptions.

Review lockout procedures periodically (semi-annually) and revise them in light of any problems that may have been identified. When you change a process or equipment, lockout requirements may also change. Review and revise your lockout procedures whenever changes are made.

## Legislation

The following sections of the Regulations for Industrial Establishments (R.R.O. 851/90) deals with lockouts:

- z s. 32: tumbling mills/dryers;
- z s. 42: power supply;
- z s. 50: silos, bins, hoppers;
- z ss. 68-71: confined spaces;
- z ss. 75-76: machinery;
- z s. 78: drums, tanks, pipelines.

## References

Ministry of Labour Engineering Data Sheet 9-02:  
Lockout Procedure for Machinery

To obtain a copy of this data sheet, contact the Ontario Ministry of Labour at (416) 326-7731 or toll-free 1(800) 268-8013.

**Lockout** is on in a series of guidelines designed to help make your workplace safer and healthier. Other guidelines in the series on

**Hazard Control Systems** include:

- z Preventive Maintenance;
- z Safety Signs and Colour at Work;
- z Work Permits.

For more information about these guidelines or to order, call 1(800) 406-IAPA (4272).

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