

PARTICIPANT HANDBOOK

# LOCKOUT / TAGOUT

*Protect Yourself and Others*





# Lockout/Tagout Employee Handbook

Every workplace has the need for on-going maintenance. Installation, repair and servicing of machines and equipment may seem routine, but can be dangerous to employees performing the work.

Serious injury can be caused by the sudden and unexpected startup of the machinery or equipment, contact with live electrical circuits or the unexpected release of stored energy. Equipment that is shut down may inadvertently be re-started or re-energized by a co-worker, or equipment that is thought to be shutdown may be controlled by automatic processors, timers or computers and may re-start automatically and without warning.



Fortunately, these hazards can be avoided through the use of lockout/tagout procedures. An employee performing the work places a lock and tag at any point where the equipment can be turned on during repairs or maintenance.

Lockout and tagout can isolate energy and control machinery and equipment, helping to protect employees servicing the equipment, protect the equipment itself and protect any equipment operators and bystanders.

It's important for you to understand lockout/tagout procedures, how and when to use them and how to safely restart the equipment or machinery. That's the best way to ensure that everyone stays safe.

*Occupational Health and Safety organizations estimate that failure to control hazardous energy sources result in:*

- *10% of serious industrial accidents.*
- *28,000 lost workdays per year.*
- *Approximately 120 deaths per year.*

# Lockout/Tagout Definitions

**Affected Employee:** An employee whose job requires him/her to operate or use a machine or equipment on which service or maintenance is being performed under lockout/tag out, or whose job requires him/her to work in an area in which such service or maintenance is being performed. Affected employees must be informed when lockout/tag out is being performed.

**Authorized Employee:** A person who locks out/tag out machines or equipment in order to perform service or maintenance on that machine or equipment.

**Bleed:** Releasing stored hydraulic or pneumatic energy.

**Block-out:** Physically preventing the movement of machinery or equipment using mechanical devices such blocks, chains, cribbing or timbers.

**Energized:** Connected to an energy source or containing residual or stored energy.

**Energy:** All sources of power to a given piece of machinery or equipment. These can be electrical, pneumatic/hydraulic, process fluids and gases and mechanical.

**Energy Control:** The use of energy isolating devices to block or isolate energy sources; lockout/tag out procedures to prevent unexpected start-up and release of stored energy during maintenance or installation.

**Energy Isolating Device:** A mechanical device that physically prevents the transmission or release of energy, including a manually operated electrical circuit breaker, a disconnect switch, a line valve, a block and any similar device used to block or isolate energy.

# Lockout/Tagout Definitions

**Energy Source:** Any source of electrical, pneumatic, hydraulic, mechanical, thermal, chemical or other energy.

**Isolation Points:** Energy source points on equipment, such as breaker panels, switches and valves.

**Lockout:** The process used to identify, cut off and secure all energy sources before beginning repairs, adjustments or maintenance. A lockout device is used to secure equipment or machinery in the off position, ensuring that the equipment or machinery cannot be operated.

**Lockout Device:** A lock (either key or combination type) that holds an energy isolating device in a safe position and prevents the energizing of a machine or equipment.

**Servicing and/or Maintenance:** Workplace activities that require lockout/tag out on the equipment before beginning the activity because employees may be exposed to the unexpected energization or startup of the equipment or the release of hazardous energy. Servicing and/or maintenance include constructing, installing, setting up, adjusting, inspecting, modifying, lubrication, cleaning, un-jamming and making tool changes.

**Tagout:** Attaching a tag to the lock on the power source that has been shut off, indicating the time, reason for the lockout and the name of the person doing the work. The tag acts as a warning not to restore energy to the equipment or machinery.

**Tagout Device:** A prominent warning tag and means of attachment which can be securely fastened to an energy isolating device in accordance with an established procedure to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

# Energy Sources

It is important to understand and identify the energy sources that provide power for machinery or equipment that is going to be serviced.

Energy sources can take many forms including:

- |                      |                        |
|----------------------|------------------------|
| - Electrical         | - Fluid and Gases      |
| - Pneumatic          | - Thermal              |
| - Hydraulic          | - Water under pressure |
| - Mechanical Thermal | - Gravity              |

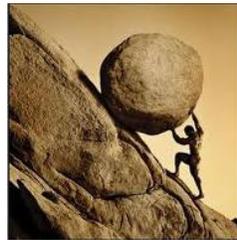
Energy refers to the movement or possibility of movement in equipment or machinery. Whether the power switch is on or off, energy is always present in any powered equipment.

Energy comes in two types:

- 1) **Kinetic (Moving) Energy** – The force caused by an object’s motion.
- 2) **Potential (Stored) Energy** – The force stored in an object that isn’t moving.



An example of kinetic energy is the energy released by a spinning shaft as it turns.



An example of potential energy is a suspended load. The load is not moving, but it is under tension, which results in energy being stored.

It is important to identify and isolate both types of energy. Equipment needs to be both shut off and prevented from releasing stored energy.

If the energy source is not isolated, a release of energy can occur. This could cause unexpected start-up, movement caused by the release of the stored energy or electrical shock. All could result in serious injury or even death.

By understanding and identifying the type and amount of energy source, you can make sure that equipment or machinery has no kinetic or potential (stored) energy that could cause injury.

# Engineering Safety Devices

Accidental start-up and/or release of stored energy can sometimes be controlled with engineering safety devices.

Some examples are:

- Machine guards
- Electrical disconnects
- Mechanical stops
- Point-of-operation guards



All of these devices are designed to provide additional safety when you are working on a piece of equipment or machinery, in addition to power shut-off.

However, no safety device is 100% safe if someone wants to bypass it. As a result, you should never rely totally on engineering safety devices as your only protection.

**Lockout/tagout must be performed in the following situations:**

- Whenever service or maintenance is being performed on or around any machine where injury could result from unexpected start-up or the release of stored energy.
- Whenever new equipment or machinery is being installed
- When a guard or other safety device must be bypassed or removed
- When an employee must place any part of his/her body where it could be caught by moving machinery

# **Procedure for Lockout/Tagout**

## ***Step 1: Preparation and Notification***

- a. **Identify energy sources.**
  - **What is the type of energy source on the equipment?**
  
- b. **Identify hazards associated with the energy sources.**
  - **What are the potential hazards related to the energy source?**
  
- c. **Identify the location the energy source can be controlled.**
  - **What steps are necessary to control the energy source?**
  
- d. **Notify all individuals that will/could be affected by the shutdown of the equipment.**
  - **Who needs to be notified that the equipment will be shutdown for service?**

**Once these questions have been answered, notify all affected employees that a lockout procedure is about to begin and that the equipment will be shut down for service.**

## **Procedure for Lockout/Tagout** (con't)

### ***Step 2: Shut Down the Equipment***

- a. Follow company safety procedures and/or manufacturer's instructions for shut down
- b. Ensure ALL energy sources have been located and shut down. (May have more than one source).

## **Procedure for Lockout/Tagout** (con't)

### ***Step 3: Isolate the Equipment***

Equipment should be isolated by:

- Shutting off the main breaker or control switch
- Closing valve
- Disconnecting process lines
- Pulling plugs

**NOTE:** For complex machines or equipment, refer to the manufacturer's control diagram detailing the locations of all isolation points, including breaker panels, switches, valves, etc.

**The following should be kept in mind when working with electricity:**

- Never pull an electrical switch while it is under load
- Never remove a fuse instead of disconnecting
- If working on electrical components, always use a voltage indicator to test all exposed components for voltage before starting any work.

## **Procedure for Lockout/Tagout**(con't)

### ***Step 4: Attach The Lock and Tag***

- a. Each employee who is performing maintenance is responsible for locking and tagging the equipment.
- b. Each employee whose duties require them to work on equipment must be provided with their own lock and key that is identified with the employee's name or identification number. It is important
- c. In some situations, employees may need several locks to lock out multiple points on a single piece of equipment or they may be working on several pieces of equipment at the same time. In these instances, the employee may need to obtain additional locks. It is important that the identification of the employee is included on each of these locks.
- d. When all energy sources are locked, apply a tag to the power source. Make sure the tag is filled out completely and correctly.

**NEVER USE ANOTHER EMPLOYEE'S LOCK AND NEVER LEND YOUR OWN.**

If more than one employee is involved in the maintenance, multiple locking devices must be used to allow each maintenance employee to lock and tag. This prevents one employee from accidentally starting up the equipment while another employee is still working.

## **Procedure for Lockout/Tagout**(con't)

### ***Step 5: Release Any Stored Energy***

After locking and tagging equipment, you must make sure that any stored energy on the equipment is released.

This is done by:

- Inspect equipment to make sure all parts have stopped moving.
- Bleeding electrical capacitance(stored charge)
- Venting or isolating pressure or hydraulic lines from the work area, leaving vent valves open
- Draining tanks and valves
- Releasing the tension on springs or blocking the movement of spring-driven parts
- Blocking or bracing parts that could fall because of gravity
- Blocking, clamping or chaining any switches or levels that could be moved into the start position
- Clearing lines containing process materials that are toxic, hot, cold, corrosive or asphyxiating
- Monitoring the process to make sure that the work you are doing will not result in an accumulation of stored energy

## **Procedure for Lockout/Tagout(con't)**

### ***Step 6: Test Equipment To Verify That All Energy Has Been Released or Controlled***

To make sure that all kinetic and stored energy has been released or controlled, you must:

- Clear personnel from danger areas
- Test the start switches on the equipment to confirm that all power sources have been shut down and switches can't be moved to the "on" or "start" position.
- Check pressure gauges to make sure that all lines are de-pressurized and stored energy has been released.
- Secure all blocks, clamps, chains and cribs.
- Check electrical circuits to make sure that voltage is at zero.
- Secure blanks (used to block feed chemicals) and make sure they are not leaking.

Because some machinery and equipment can be remotely controlled, you must consider equipment to be energized and in motion at all times except when you have personally locked it out of operation and tested equipment to verify that the energy state is zero.

If ALL tests are passed, begin working on equipment. Only after you have confirmed that all energy sources have been controlled and locks and tags are in place, is it safe to begin the maintenance work.

While working, you should avoid any actions that could re-activate the equipment.

When installing new piping or wiring, you should make sure the lockout is not bypassed.

## **Safe Startup Procedures**

Once the maintenance or installation is completed, the equipment can be re-started. These are the procedures to follow for safe startup:

### **Step 1: Preparing For Startup**

You must make sure the area is safe for startup by:

- Making sure all equipment components are fully assembled and operational
- Making sure all safety guards are in place
- Removing all tools from equipment and the work area
- Removing all braces, pins, blocks cribs and chains
- Reconnecting all pressure tubing, pipes and hoses and closing all valves
- Clearing the work area of all personnel

### **Step 2: Remove Lockout Devices and Tags**

Except in emergencies, each lockout device must be removed by the employee who put it on.

### **Step 3: Notify Affected Employees**

Notify all personnel in the area that maintenance, serving or installation is complete, lockout/tagout has been removed and the machine/equipment is ready to be re-started.

Once all three steps are completed, it is safe to start up the equipment.

# Lockout and Tagout Devices

## Lockout Devices:

- Must be provided to each employee
- Must only be used for the purposes of lockout/tagout
- Must be able to withstand the environment that they are exposed to for as long as they are in place
- Must be standardized by color, shape and size

## Tagout Devices:

- Must be standardized by color, shape, size and format or print
- Must contain warnings such as "DANGER – DO NOT OPERATE THIS MACHINE"
- Must have space for the name of the lock or tag owner, date and purpose of the lockout/ tagout

## Tagout Only:

A tagout system can be used instead of a lockout system in the following situations only:

- When an energy isolating device cannot be locked out
- When the employer can prove that a tagout system provides the same amount of protection as a lockout system

If a "Tagout Only" system is used, the tags must be placed at all isolation points, and you must follow all safety procedures.



## Special Situations

Some situations may occur in the workplace that require additional procedures to perform safe lockout/tagout.

**Removing someone else's lock:** A lock may be removed by someone other than the employee who placed the lock only under the following condition:

- The employee whose lock is to be removed is not available to remove the lock after servicing has been completed
- All reasonable efforts have been made to contact the employee to inform him/her that the lock has been removed
- The employee is contacted and informed that the lock is removed prior to the employee starting work on the next work shift

**Shift Changes:** If maintenance on a piece of equipment will extend beyond one shift, provisions must be made to have employees from the new shift place their locks on the lockout device before they begin work on the equipment. This must be done without interruption in lockout/tagout protection.

**Outside Contractors:** If outside contractors will be working on equipment for Halifax Water, they must be informed of the Halifax Water Logout/Tagout Policy and Procedures. If the contractor has a procedure that is different from Halifax Water, you must make an agreement with the contractor as to which procedure will be followed. All employees working on the project must be notified of any changes in their own procedure.

**Temporary Re-activation:** If the equipment being serviced must be temporarily re-activated (for example, to test the equipment as part of installation), all startup and lockout/tagout procedures must be followed.





*Trailwalk Holdings Ltd.*



Maintenance Consulting

***Trailwalk Holdings Ltd.***  
***391 Wentworth Rd. RR#1***  
***Windsor, NS B0N 2T0***  
Web: [www.trailwalk.ca](http://www.trailwalk.ca)  
Email: [peter@trailwalk.ca](mailto:peter@trailwalk.ca)  
Telephone: 902-798-3601