CONTROLLING CHEMICAL HAZARDS

Guidance Sheet

IMPORTANT HSE TOPICS **LOCK-OUT / TAG-OUT SYSTEM**

What is a Lock-out / Tag-out System?

The purpose of a lock-out/tag-out system is to control potentially hazardous energy associated with machines or equipment in order to prevent injuries during maintenance or repair operations. If machinery could inadvertently activate, or if the unexpected release of energy could cause injury, then the law requires that energy source(s) must be isolated and controlled by using some type of lock-out system.

A lock-out device is something that uses a positive means (such as a lock) to hold an energy-isolation device in a safe position and prevent the energizing of a machine or a piece of equipment. Each lockout device must always be accompanied by a tag-out device. A tag-out device is something attached to the lockout device that is used to communicate vital information about the lockout, including the identity of the person who applied the device, the reason for locking out, and the date and time. It also warns workers not to operate that equipment.

What Steps Must You Follow

Step 1. Preparation for Shutdown

Before work begins the person directing work (supervisor) must:

- Identify all hazards (including stored energy)
- Identify the types and magnitude of energy to be controlled
- Identify the method or means of controlling the energy
- Identify the location of switches, energy sources, controls, interlocks or other such devices necessary to isolate the system
- Assess the consequences of shutdown
- Notify all affected persons that the equipment will be shut down and locked/tagged out
- Conduct a written job hazard analysis.

Step 2. Equipment Shutdown

The equipment shall be shutdown following established procedures. Ensure all points of operation are considered, including remote control points.

Step 3. Equipment Shutdown

The equipment shall be isolated by following established isolation procedures which specify the use of disconnect switches, line valves, blocks, blanks, removal of spools, and capping of lines etc., as required.

Computer shutdown alone does not constitute a proper isolation procedure.

Step 4. Application of Lock-out Devices

Locks must be applied to each of the isolation devices. Each employee working on the equipment is responsible for attaching his/her personal lock and keeping the key, without exception. A multi-lock hasp or scissor device may be used to allow the application of more than one lock to a single energy isolating device.

Tags must be attached to each lockout device. The tag should state the employee name, employer, and contact information of the person who applied the device, the reason for locking out, the date and time.

Step 5. Release of Stored Energy (De-energization)

Once all necessary lock-out devices have been applied, all potentially hazardous stored or residual energy must be relieved, blocked, bled, restrained, grounded or rendered safe. See Appendix A attached.

Step 6. Verification of Isolation

Prior to starting the work, and after isolation and de-energization, the person directing the work (supervisor) should perform a test of all start buttons and other activating controls on the equipment to check potential of the electrical supplies to ensure the equipment has been de-energized. Return all of the controls to the off or neutral position after trying to start.

For work involving several points of isolation, the person directing the work (supervisor) must keep record of the devices opened, locked off or otherwise rendered inoperable so that all of these devices can be reactivated once work is complete. Each person who has placed a personal lock on the equipment should be assured of his/her right to verify individually that the potentially hazardous energy has been isolated and/or de-energized before the repair or maintenance work begins. Once isolation has been verified, perform the repair or maintenance work. While working:

- Do not do anything that could re-activate the equipment.
- Do not inadvertently bypass the lockout (e.g. when installing a new pipe or wiring.)

Step 7. Release from Lock-out Control

Prior to restoring energy to the person directing the work (supervisor) must perform an assessment of the work area to determine that:

- the machine or equipment is operationally intact
- all necessary guards have been re-installed
- all tools and materials used during the repair or maintenance activities have been removed
- all temporary de-energization measures and devices have been removed by those who placed them all other workers and
- affected individuals have been informed that the energy is about to be restored all other workers and affected individuals are clear of the equipment (perform a head count if necessary)

The last lock to be removed should be that of the person supervising the lockout. This responsibility should not be delegated to another person. Follow the required steps to re-energize the system.

What to do in Special Situations?

Multiple Person Lockouts: If more than one employee works on the same equipment, each person must attach his/her lock to the multi-lock hasp on the energy-isolating device. The person directing work (supervisor) must keep a log record of all locks applied and removed during the procedure. Written entries should be made to the log by each person applying or removing a lock.

Where there are several lockout points to be secured and several employees involved on the job, a Group Lockout Procedure is followed:

- The supervisor obtains a lock box and secures it to the machine or equipment.
- Lock box locks from the lock box and tags are applied to all the lockout points by authorized employees under the direction of the supervisor.
- The keys are collected, verified and placed inside the lock box.
- The lock box is then closed and a multi-lock hasp is affixed to allow additional locks to be added.
- The last available hole should never be used for a lock, but should remain open to add another multiple lockout device if needed to create more spaces. In this way, as many locks as needed can be added to the equipment.
- Each worker on the job then applies his/her personal lock to the multi-lock hasp such that the box cannot be opened until each personal lock is removed. Each worker's personal lock remains in place as long as he/she is actively working on the locked out equipment.
- In all cases, the last lock to be removed should be that of the person supervising the lockout. This responsibility should not be delegated to another person.

Shift or Personnel Changes: If the work lasts longer than one shift, or when the employee who applied the lock must leave the workplace, lockout protection must not be interrupted. There are at least two approaches to ensure continuity of lockout control:

- The replacement worker applies his/her lock before the departing worker removes his/hers. This also provides an opportunity for discussion regarding the status of the job or
- A control lock is applied, along with each personal lock. When an employee has completed his/her shift but the work is not completed, he/she removes the personal lock, and communicates to the supervisor any outstanding work required. The control lock(s) must remain in place until the equipment is safe to return to service or has been rendered incapable of being returned to service, i.e. physically disconnected.

ENERGY SAFETY CANADA

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PRECAUTIONS YOU SHOULD TAKE:

- ❒ Ask your employer about the risks, what precautions to take and what to do in an emergency.
- ❒ Follow the safe working procedures laid down by your employer.
- ❒ Take necessary lock-out/tag-out training.
- ❒ Report to your supervisor any damaged or lock-out or tag-out equipment.
- ❒ Use and maintain all required personal protective equipment.
- ❒ Do not do anything that could reactivate equipment.
- ❒ Don't start work on equipment until you are sure it safe to do so.

Appendix A: General Lock-out Guidelines According to Energy Forms and Sources*

ENERGY FORM	ENERGY SOURCE	GENERAL LOCKOUT GUIDELINE
Electricity	• power transmission lines • machine power cords • motors • solenoids • capacitors (stored electrical energy) • generators • batteries • photovoltaic arrays	• Turn off power at machine first (point of operation switch), and then at main disconnect switch for machine; lock and tag main disconnect switch (or remove fuses from box, and then lock and tag box). • Fully discharge all capacitive systems (e.g. cycle machine to drain power from capacitors) according to manufacturer's instructions. • Install grounds where necessary.
Fluid Pressure	• Hydraulic systems - hydraulic presses - rams - cylinders - hammers	• Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves; bleed off and blank lines as necessary. • Block any possible movement of machinery.
Air Pressure	• Pneumatic systems: - lines - pressure reservoirs - accumulators - air surge tanks - rams - cylinders	• 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.
Kinetic Energy (energy of a moving object or materials - moving object may be powered or coasting)	• blades • flywheels • materials in • supply lines of • bins or silos	• Stop and block machine parts, and ensure that they do not recycle. Review entire cycle of mechanical motion; ensure that all motions are stopped. • Block material from moving into area of work and blank as required.
Potential Energy (energy stored in an object with the potential for release due to	• springs • actuators • counterweights • raised loads • top or movable part of a press or lifting device	• If possible, lower all suspended parts and loads to the lowest (rest) position, block parts that might move due to gravity; release or block stored spring energy.
Pressurized liquids and gases (including steam, chemicals)	• supply lines • storage tanks and vessels	• 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.

* Adapted from "A Health and Safety Guideline for your Workplace," Industrial Accident Prevention Association, 2000