Energy Control Standards

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1. Introduction

The purpose of these energy control standards (sometimes called "lock out tag out" [**LOTO**] or "lock out tag out try out" [**LOTOTO**]) is to ensure persons entering the danger zone of any piece of machinery are not put at risk from the hazards of the machinery. This can be during normal operation of the machine (e.g. for setting up purposes) or during maintenance or repair of the machinery. Following robust energy control standards ensures each individuals safety when entering the danger zone of a machine.

There must be measures in place to ensure isolation of equipment from sources of energy to allow maintenance to take place or to temporarily isolate equipment when an unsafe condition exists. Also, reconnection of any energy source to work equipment must not expose anyone using the equipment to any risk to their health and safety.

As well as the need for positive isolation of energy sources these standards also emphasise that ALL individuals working in the danger zone have control over the isolation(s) [because they have a key securing the isolation(s) with them].

2. Types of energy

When machines or equipment are being prepared for service or maintenance, they often contain some form of "hazardous energy" that can cause harm to people in the area. Hazardous energy, is any type of energy that can be released and might harm a person. This could include energy of the following types:

- Chemical;
- Electrical;
- Hydraulic;
- Mechanical;

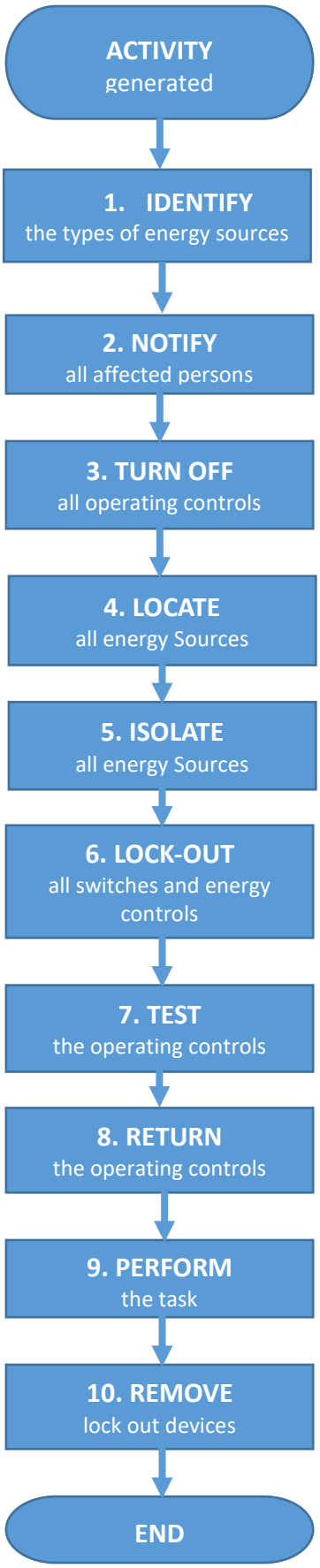
- Pneumatic;
- Thermal; and
- Other sources of energy

Without the use of proper energy control measures, the serviced equipment can unexpectedly start up or otherwise release these forms of energy. This can lead to injuries and even death to the people working on the machine and even to others working in the area or living in the community.

3. Steps to control energy

The first step to robust energy control is hazard identification in order to understand what needs controlling to prevent harm, therefore no activity should take place until a suitable risk assessment has been undertaken and any necessary changes / precautions have been decided upon, implemented, recorded and communicated. Control of energy forms part of this process along with other systems e.g. Permit to Work (PTW) or Standard Operating Procedure (SOP).

The following steps must be taken to ensure a consistent approach is taken when controlling energy sources and carrying out isolations:



What are the potential hazards?
What are the control devices?
(Check Risk Assessments, Work Instructions, Schematics, P&IDs, etc.)

Consider carefully who could be affected by the activity – not just those doing the actual task.

Consider

- Electrical supply
- Hydraulics – consider stored energy
- Pneumatics – consider stored energy
- Stored energy from contained fluids (e.g. water stored under pressure)
- Others include; Steam; Vacuum; Wind; Gravity; Radiation; etc.

Isolate ALL energy sources, prime movers (testing for dead) by blocking/bleeding and venting or draining stored energy as found in springs, hydraulic systems and pneumatic systems

Physically Lock-out all switches and energy controls by positive isolation (class 1). Where positive isolation is not possible a class 2 isolation may be carried out subject to appropriate controls.

Testing for dead must be carried out and an operational check to ensure no movement or potential energy. Be sure no one can get hurt before commencing test (sometimes called "Try Out")

Put all the controls back in the OFF position.

Those in the "danger zone" should have procession of isolation keys.

Remove Isolations ONLY after the equipment is fully assembled and all *affected persons* have been notified. Must be done by an *Authorised Person*. Each personal lock-out device must be removed by the individual who attached it and all persons have signed off the permit (If applicable) before removing the isolation(s).

Prove the operation of equipment to ensure normal functionality and hand back.

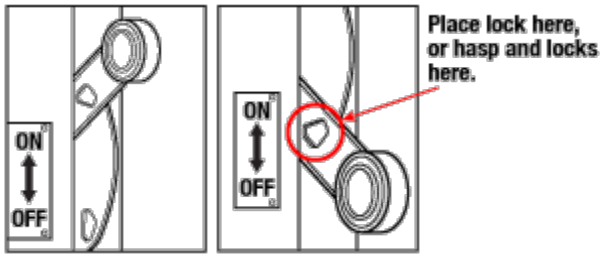
4. Isolation and lock out

Important: A switch in the OFF position (or triggering an interlock) is not enough! A positive isolation of the energy source must be made in order to prevent accidental restart.

Some methods of isolation include:

4.1 Electrical energy

Switch electrical disconnects to the off position. Visually verify that the breaker connections are in the off position. Lock the disconnects into the off position and test for dead.

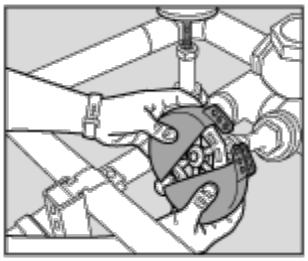


4.2 Hydraulic and pneumatic potential energy

Set the valves in the closed position and lock them into place. Where possible remove potential energy by opening the pressure relief valves, vent lines, bleeding the system, drain lines or tank. Where possible the two-valve rule should apply isolating 2 valves upstream and 2 valves downstream of point of isolation or intervention.

- Safety: Ensure hearing protection is worn and a loud vocal alarm (LVA) is made to warn those in the vicinity when venting pressurized gas or air ‘’Ears’’.
- Environment: When bleeding or draining ensure a suitable receptacle is available if not returning to tank or system and that, any waste or oil is disposed of correctly.

NOTE: For LPG and Steam – a two-valve isolation is mandatory.



4.3 Mechanical potential energy

Carefully release energy from springs that may still be compressed. If this is not feasible, block the parts that may move if there is a possibility that the spring can transfer energy to it.

4.4 Gravitational potential energy

Use a safety block or pin to prevent the part of the system that may fall or move.

4.5 Chemical energy

Locate chemical supply lines to the system and close and lockout the valves. Where possible, bleed lines and/or cap ends to remove chemicals from the system.

4.6 Dissipation of residual or stored energy

In general, examples include:

Electrical energy

To find a specific method to discharge a capacitor for the system in question, contact the manufacturer for guidance. Many systems with electrical components, motors, or switch gears contain capacitors. Capacitors store electrical energy. In some cases, capacitors hold a charge in order to release energy very rapidly (e.g., similar to the flash of a camera). In other cases, capacitors are used to remove spikes and surges in order to protect other electrical components. Capacitors must be discharged in the lockout process in order to protect workers from electrical shock.

Hydraulic and Pneumatic potential energy

Set the valves in the closed position and locking them into place only isolates the lines from more energy entering the system. In most cases, there will still be residual energy left in the lines as pressurized fluid. This residual energy can be removed by bleeding the lines through pressure relief valves. Contact the manufacturer for more specific details, or if no pressure relief valves are available, what other methods are available.

Mechanical potential energy

Carefully release energy from springs that may still be compressed. If this is not possible, use blocks to hold the parts that may move if the energy is released.

Gravitational potential energy

If feasible, lower the part to a height where falling is impossible. If this is not possible, contact the manufacturer for guidance.

Chemical energy

If available, bleed lines and/or cap ends to remove chemicals from the system.

5. Protecting workers in the danger zone

This is achieved by applying a lock to the physical isolation and then all persons entering the danger zone applying their personal locks to control access to the isolation(s) key, usually using a lock box.

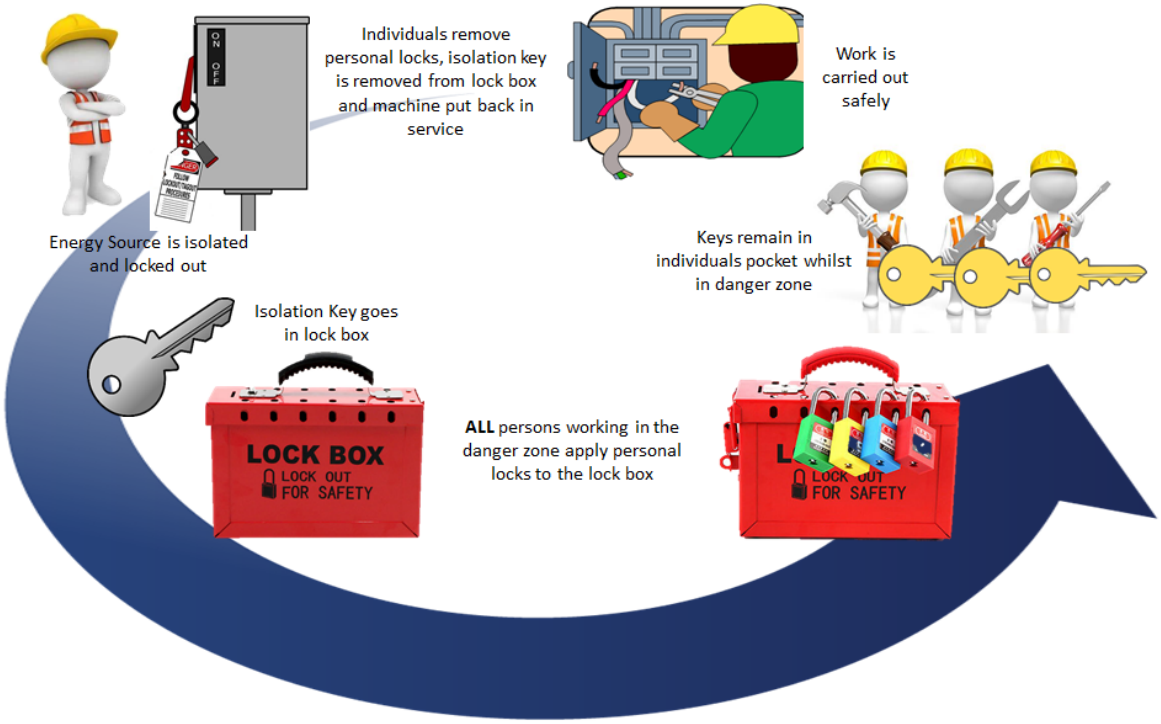


Figure 3: Example of lock out process using a Lock Box.

- Each lock should only have one key (no master keys are allowed);
- All locks should be uniquely identifiable;
- Isolation are applied and positively locked using an approved lock;
- Any other affected persons should also apply their personal locks to ensure their safety;
- There should be as many locks on the system as there are people working on it. For example, if a maintenance job requires 3 workers, then 3 locks should be present and each of the individuals should place their Personal Lock on the system (or on the Lock Box); and
- Personal Locks can only be removed by those who installed them.

6. Test for dead (or try out)

An important step of controlling energy and ensuring work can be carried out safety is the “test for dead”. It’s not uncommon for a machine to have more than one energy source and/or confusing isolation points and the confusion could cause the machine to be functional still. A test for dead or try out should always be carried out to prove the isolation(s) have been effective and the machine is in fact dead / non functioning.

7. Contractors

Whenever Contractors are to be engaged in activities that require energy control, the Shift Supervisor shall inform the Contractor of this Lockout Policy. Contractors MUST follow the standards applying physical locks to isolations (note they may also apply their own *personal lock* to ensure their own safety). The Shift Supervisor is responsible for ensuring this takes place, that it is part of the Contractors RAMS and competency checks of the contractor is made before work commences.

8. Shift handover/ suspension

In the event the job cannot be completed in the same shift it was started, then the shift employees finishing must ensure they remove any *Personal Locks* and sign off any relevant PTW or SOP. *Affected persons* on the following shift must then apply their own *Personal Locks* and must sign on to any relevant PTW or SOP before commencing work again. At shift hand over there must be a dialog between the Shift Supervisors or their deputies (using a *Handover Log* where appropriate). If necessary, the shift finishing should walk the job with the shift starting to ensure full awareness of all safety requirements, including points of isolation.

In some instances, a job cannot be completed within a run of shifts due to waiting for parts or other delaying factors. Under these circumstances any relevant PTW must be suspended, *Personal locks* should be removed and any isolation locks must remain applied. In the case of electrical panels, even though isolated they shall be closed using the proper mechanism whenever work is not performed on them.

9. Forcibly removing a 'lock out'

NOTE: To forcibly remove a lock out must only be undertaken in as a last resort after authorisation from the Shift Supervisor.

In exceptional circumstances, a lockout may still be in place due to factors such as a lost key or someone gone home with key in pocket etc. In such a case, it may be necessary to safely remove the lockout in order to allow production to proceed. Precautions must be taken to ensure safety following these steps:

- Identify the owner of the lock(s) their Supervisor;
- Verify that the employee has in fact left the premises;
- Try to contact the person (at home, etc. if necessary) to resolve the situation;
- Wherever possible the person with the key must return to site to remove their personal lock; and
- If not resolved, try to contact the persons Supervisor (at home, etc. if necessary).

If still not resolved, be sure by verification:

- There is no personnel working on the job;
- The job is completed;
- The equipment is safe and ready for service;
- That any relevant PTW has been cancelled as the work completed; and
- That no other system can be affected by removing the isolation and that by doing so does not introduce any known new risk.

The Shift Supervisor can then authorise the lockout removal by force.

The above steps must be recorded and include the Shift Supervisors signed authorisation.

10. Training

Supervisors are responsible for ensuring those persons responsible for applying isolations are have the sufficient information, instruction, and training to carry out the task; including familiarisation with these standards. Any persons required to work under energy control conditions must understand their role in the process.

11. Record Keeping

Training records must be retained securely and be made available upon request by management, HS&E Department and/ or Enforcing Authority.

12. Monitoring

Due to the high risks involved with operatives working closely to energy sources it is essential that isolation and lockout procedures are closely monitored by all levels of Supervisor and Management. The Group HS&E department will monitor compliance with these standards during routine HS&E inspections.

13. Tool Box Talk

Refer to HSMS TBT – Energy Control

VERSION ISSUED	Date
Version 1 Sections 1,2,3, 4.1-6,5,6,7,8,9,10,11, 12,13	09.12.2021