



<b>Work Procedure</b>	<b>Adapted From:</b> UBCO-RMS-OHS-WP 16-001
<b>School of Engineering Machine Shop</b>	Date Created: Nov 11 2017 Date Updated: N/A Supersedes: N/A

# Isolation and Lockout

## 1. SCOPE

This procedure establishes minimum and uniform requirements for the isolation, securing, locking, and tagging of machinery and equipment so that work can be carried out without inadvertent re-energization, release of energy, or movement. This procedure applies to all situations where a device has been put in a safe position so that work can be carried out safely. This is a mandatory requirement for all Facilities Management personnel on the Okanagan campus.

The hazards that are to be mitigated through the use of this procedure are:

- Inadvertent re-energization of machinery or equipment
- Unexpected release of energy
- Unexpected movement of machinery or equipment

Three specific procedures are identified in this work procedure:

- Personal Lockout
- Group Lockout
- Use of Shop Locks

## 2. PURPOSE

This document specifies procedures for safely isolating and locking out energized systems, equipment and apparatuses in the School of Engineering Machine Shop on the Okanagan campus.

## 3. POLICY

1. UBC will take all reasonable measures to provide a safe workplace. All UBC operations must be performed in a manner which will prevent any undesirable effects to UBC and/or UBC employees, assets, the local community, and the environment.
2. The provisions of this program and all applicable standards will be followed to ensure the reliable operation of utility systems. Failure to follow the requirements of the Isolation and Lockout Program will be cause for disciplinary action for UBC employees and potential fines & penalties for contractors.
3. UBC Okanagan’s Isolation and Lockout Program is meant to work with applicable portions of WorkSafeBC Occupational Health and Safety Regulations, and thus should not be in conflict with their requirements.

## 4. BACKGROUND

### *Definitions*

"Checklist" is a list of all machinery, equipment and energy-isolating devices requiring lockout that had been identified through a review of drawings, identification data, and in consultation with knowledgeable parties.

"Control System Isolating Device" is a device that physically prevents activation of a system used for controlling the operation of machinery or equipment.

"Energized" is a state that exists when something is connected to an energy source that has not been isolated.

"Energy-Isolating Device" is a device that physically prevents the transmission or release of an energy source to the machinery or equipment.

"Energy Source" is any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other source of energy of potential harm to workers.

"Group Lockout" is the procedure used where there are five (5) or more isolation points to be locked out, and/or four (4) or more people working on the equipment and/or where the isolation points are a considerable distance apart.

"Group Lockout Procedure" is a procedure that states site-specific requirements for a project requiring group lockout.

"Group Lockout Tag" is a tag that must be placed on all devices that have been locked out as part of a group lockout procedure, identifying the machinery or equipment locked out, and the names of the person(s) who applied the lock; this tag will be white with black lettering.

"Group Locks" are locks dedicated to group lockouts, sufficient in number to lock out isolation points in a group lockout procedure; keys are available only to the qualified workers applying the group lockout and the responsible supervisor.

"Isolation" (i.e. "isolate") means separating an energy-isolating device from machinery or equipment by means of a gap, barrier, blind, blank, or similar means.

"Lock Box" is a sturdy container used to secure keys for group locks used in group lockout; is capable of being secured and sealed.

"Lockout" is the use of one or more locks to render machinery or equipment inoperable, or to isolate an energy source in accordance with a written procedure.

"Lockout Logbook" is a logbook where the relevant information (as stated in section 7.5.6) must be recorded when a Shop Lock is applied.

"Personal Lock" is a lock provided by the employer for use by a worker to ensure personal lockout protection such that each lock when applied is operable only by a key in the worker's possession;

the lock must be marked to identify the worker who placed the lock, and the shop of that worker; Personal Locks are to be used for personal protection only and are not to be used as a Shop Lock.

"Personal Lockout" means to place a personal lock on energy-isolating devices to prevent hazardous energy from being released and to ensure personal lockout protection only.

"Personal Tag" is a tag placed in conjunction with a personal lock to signify that work is being carried out on machinery or equipment that is associated with the personal lock; this tag will be white with black letters, with a distinctive hatched red border to signify a worker is working on the machinery or equipment.

"Positive Sealing Device" is a uniquely numbered one-time-use-only device - acceptable to the board - that has a seal that will show if it has been tampered with.

- Is to be used in all group lockout procedures as a means to secure the keys in the lockbox.
- Requires 2 qualified workers to apply as per section 7.6.3 - Application of Group Lockout.
- The identification number of the positive sealing device applied must be recorded on the checklist.
- It must be clearly stated in the group lockout procedure that this device is to be used.

"Qualified Supervisor" is a supervisor who is technically competent and has specialized knowledge of building systems and of the current work being carried out on those systems.

"Qualified Worker" is a worker who is knowledgeable of the work, the hazards involved and the means to control the hazard by reason of education, training, experience or a combination thereof.

"Shop Lock" is a lock provided by the responsible supervisor for the removal of service of equipment for seasonal shutdowns, temporary shutdowns, continuity purposes or other similar purpose; a Shop Lock does not constitute effective lockout - no one is to work behind a Shop Lock without establishing effective lockout in accordance with this procedure.

"Status Tag" is a tag used in conjunction with a Shop Lock when a worker is not working on the machinery or equipment to indicate the status of the machinery or equipment and the reason for the Shop Lock being placed on the energy-isolating device; it must be indicated on the tag that the Shop Lock does not constitute effective lockout; this tag will be yellow with black lettering.

"Supervisor" is a person who instructs, directs, and controls workers in the performance of their duties (note: this includes Heads and Sub-Heads).

## **5. RESPONSIBILITIES**

1. Employer - Associate Vice President and Directors
  - a. Ensure that the lockout procedure is implemented, including training, quality assurance system and requirements, monitoring and review of the procedure.
  - b. Assign responsibilities for implementation and monitoring to ensure the program runs effectively.

- c. Ensure that adequate resources are made available for the implementation and continued operation of this lockout procedure.
2. Supervisors - Associate Directors
  - a. Implement the lockout procedure and ensure that the necessary systems are put in place and training is provided.
  - b. Assign responsibilities to ensure the lockout procedure is implemented.
  - c. Monitor lockout procedure and ensure that it is operating effectively.
3. Supervisors - Managers, Lead Hands, Project Managers and Owner Representatives
  - a. Ensure that the lockout procedure is implemented.
  - b. Ensure that all workers are trained in all aspects of this procedure.
  - c. Give adequate directions to workers so that work can be carried out safely.
  - d. Ensure that checklists used for group lockouts are accurate and complete and that group lockouts are carried out in accordance with the checklist and this procedure.
  - e. Monitor the procedure for its compliance and effectiveness and make recommendations as may be appropriate for its improvement.
4. Workers
  - a. Carry out their work in a safe manner and in compliance with the established procedures.
5. Contractors
  - a. Under the direction of the Project Manager or Owner Representative, contractors are to carry out their work in a safe manner and in compliance with the established procedures.

## 6. REFERENCES

WorkSafeBC Occupational Health and Safety Regulations (BC OHSR) - Part 10: De-energization and Lockout (<http://www2.worksafebc.com/publications/OHSRegulation/Part10.asp>)

## 7. PROCEDURE

### 7.1. Personal Lockout Equipment

- 7.1.1. Each worker required to apply a personal lock must be assigned a set of personal locks keyed alike complete with a key, personal tags, status tags and lockout scissors.
- 7.1.2. If the assigned work requires more than five (5) lockout points, then the group lockout procedure must be used.

### 7.2. Energy Isolating Device Identification and Isolation

- 7.2.1. The worker who has been assigned a project or task is responsible for the identification, isolation and lockout of the energy isolating devices and remains responsible until they remove their personal lock.

- 7.2.2. Identification of the energy isolating devices that require lockout must be done through a review of drawings, identification data, trial & error or similar means.
- 7.2.3. When the correct device has been identified and isolated, all stored energy must be drained or bled off, pressure released and any potential for movement removed or positively blocked against movement.
- 7.2.4. To confirm effective lockout, an attempt must be made to operate the machinery or equipment to confirm that it will not start up or operate.

### **7.3. Application of Personal Locks**

- 7.3.1. These locks are to be used only in personal lockout procedures.
- 7.3.2. The worker who has been assigned to carry out the work must place a lockout scissor, personal lock and personal tag on the energy-isolating device after it has been switched off or otherwise placed in the safe position.
- 7.3.3. Any additional worker who is required to work on that machinery or equipment must place his or her own personal lock on the lockout scissors. Once that worker's job is complete he/she alone is responsible to remove his/her personal lock.
- 7.3.4. A personal lock must not be placed in the last hole of a lockout scissors. Instead, another lockout scissor must be applied and the personal lock placed on the additional lockout scissors.
- 7.3.5. This personal lock will remain in place at all times while there is a hazard to the worker.
- 7.3.6. When the person who placed the lock is no longer working on the equipment, and the work is incomplete, the personal lock and tag must be replaced with a Shop lock and status tag. A Shop lock does not constitute effective lockout. No one is to work behind a Shop lock without establishing effective lockout in accordance with this procedure.

### **7.4. Removal of Personal Locks**

- 7.4.1. A personal lock may only be removed by the owner of the lock.
- 7.4.2. In situations where a personal lock has been left on a device, and it is necessary to remove that lock and the worker is not available, a Lock Removal Form must be filled out and the following procedure must be adhered to and documented.
- 7.4.3. A manager must be contacted, and manager will determine whether a site visit is required to approve the removal of the lock.
- 7.4.4. The immediate qualified Supervisor and/or Manager must:
  - a. Make every reasonable effort to contact the worker who placed the personal lock.
  - b. Attempt to determine the reason for the lockout.
  - c. Ensure it is safe to remove the lock and energize system.
  - d. Get prior approval from the manager if additional work is required to make the system safe to energize.
  - e. Contact the manager when system is made safe to energize to receive manager's permission to remove the lock.
  - f. Ensure the Lock Removal Form is completed before lock is removed.
  - g. Remove the lock in the presence of another qualified worker.
- 7.4.5. The manager must:
  - a. Sign the Lock Removal Form.

- b. Inform the worker at the start of their next shift that their lock has been removed.
- c. Initiate a formal incident investigation. The completed Lock Removal Form must be submitted with the Incident Investigation report.

#### **7.5. Application and Removal of Shop Locks**

- 7.5.1. Numbered shop locks will be made available in the Central Heating Plant (CHP).
- 7.5.2. The locks and keys are under the control of the shop supervisor and will be issued as required for specific use.
- 7.5.3. The use of these locks is for the securing of equipment or machinery, seasonal shutdown, temporary shutdowns, continuity, or similar purposes. A Shop lock does not constitute effective lockout.
- 7.5.4. No one is to work behind a Shop lock without establishing effective lockout in accordance with this procedure.
- 7.5.5. A status tag must be used in conjunction with a Shop lock and must record the following information on the tag:
  - a. Worker's name and department
  - b. The date
  - c. Reason for lockout
  - d. Signature
- 7.5.6. Shop Locks can only be removed by a qualified and authorized worker provided they:
  - a. Review all pertinent information recorded in the logbook;
  - b. Are aware of the scope of the work involved; and
  - c. Contact their immediate supervisor if any of the information identified in (a) and (b) is not available or is not understood.
- 7.5.7. A Lockout Logbook will be made available in the Central Heating Plant (CHP). Any time a Shop Lock is left on at the end of a shift the following details must be recorded in the logbook by the person who applies the lock:
  - a. Date the Shop lock was applied
  - b. Shop lock number
  - c. Equipment and device
  - d. Location
  - e. Reason for lockout
  - f. Who applied the lock
  - g. Job work order number

#### **7.6. Application of Group Lockout**

- 7.6.1. The group lockout procedure is applicable in situations where there are a large number of energy isolating devices that must be locked out &/or where the isolation points are a considerable distance apart &/or where any machinery/equipment requires more than five (5) isolation points to be locked out &/or when there are four (4) or more people working on the equipment.
- 7.6.2. Group locks, with keys available only to the two (2) qualified workers applying the procedure and the supervisor in charge, must be used for this procedure.

- 7.6.3. To initiate the application of Group Lockout, two (2) qualified workers must take responsibility to:
- a. Ensure a site specific "Group Lockout Procedure" is developed;
  - b. Ensure there is an established checklist that lists all the necessary energy isolating devices that require lockout;
  - c. Ensure the supervisor has checked and confirmed that the checklist and the group lock procedure is complete and accurate;
  - d. Personally lock out and attach a group lockout tag to all energy isolating devices identified on this checklist;
  - e. Clearly print their names and contact phone numbers on the checklist, and sign the checklist;
  - f. Locate a lockbox in a prominent location as near as possible to the machinery or equipment shut down by the lockout;
  - g. Post the signed checklist by the lock-box;
  - h. Post the site specific "Group Lockout Procedure" by the lockbox;
  - i. Place all the keys for the locks used in the group lockout in the lock-box and secure lock-box with a positive sealing device acceptable to the board;
  - j. Record the identification number of the positive sealing device on the checklist;
  - k. Hold a pre-job meeting with all workers who will be applying personal locks and working on the machinery.
- 7.6.4. When the correct devices have been identified and isolated, all stored energy must be drained or bled off, pressure released and any potential for movement removed or positively blocked against movement.
- 7.6.5. As a last confirmation of safe condition, an attempt must be made to operate the machinery or equipment to confirm that it will not start up or operate.
- 7.6.6. Before commencing work each employee working behind the group lockout must apply a personal lock and tag to the lock box and any additional equipment requiring personal lockout. Each worker must make sure the serial number of the positive sealing device matches the serial number recorded on the checklist.
- 7.6.7. Any additional workers assigned to the project must understand the parameters of the work and review the checklist and group lockout procedure before adding their personal locks.

## **7.7. Removal of Group Lockout**

- 7.7.1. On completion of their work, workers must remove their personal lock from the lock box.
- 7.7.2. Once all workers have removed their personal locks as per Section 7.7.1, two qualified workers must determine whether it is safe to end the group lockout.
- a. If it has been determined safe to end the group lockout any two qualified workers can be assigned the responsibility to remove the sealing device.
  - b. If the two qualified workers who determine it is safe to end the group lockout are different than the two qualified workers who initiated it, they must also clearly print their names and contact phone numbers on the checklist, and sign the checklist.

- 7.7.3. Once the positive sealing device has been removed from the group lock box, the group lockout is no longer in effect. If the seal on the group lock out box has been changed or tampered with in any manner, an immediate halt is to occur to the work being carried out under the group lock out.

#### **7.8. Alternate Procedures**

- 7.8.1. For power systems as defined in Part 19 (Electrical Safety) of the BC OHSR (<http://www2.worksafebc.com/publications/OHSRegulation/Part19.asp>), the requirements of that Part must be followed.
- 7.8.2. For mobile equipment as defined in Part 16 (Mobile Equipment) of the BC OHSR (<http://www2.worksafebc.com/publications/OHSRegulation/Part16.asp>), the requirements of that Part must be followed.
- 7.8.3. In an emergency where lockout cannot be immediately applied, the energy isolating devices or control system devices must be effectively controlled to prevent inadvertent start up or hazardous energy release. As soon as the emergency is controlled, lockout must be applied as per this procedure to complete repairs.

#### **7.9. Locks Not Required**

- 7.9.1. On a tool, machine or piece of equipment which receives power through a readily disconnected supply, such as an electrical cord, quick release air or hydraulic line, or similar device, is disconnected from its energy supply and the connection point is kept under the immediate control of the worker at all times while work is being done.
- 7.9.2. On electrical distribution panels where a qualified electrical worker disconnects the wires from the breaker, appropriately insulates the wire ends and places a status tag on the wires.

#### **7.10. Machine Shop Equipment Specific Lockout Procedure**

- 7.10.1. Haas UMC 750
- a. Lockout breaker located on right side of machine
  - b. Flip main power breaker to OFF and attach lockout device
- 7.10.2. Omax Waterjet
- a. Pull out yellow tab on red power switch
  - b. Attach lockout device
- 7.10.3. Haas TL1 Lathe
- a. Located at rear of machine on electrical box is the main power breaker
  - b. Flip main power breaker to OFF and attach lockout device
- 7.10.4. Mills #1 and #4
- a. On right hand side of machine is a yellow/red switch
  - b. Turn switch to OFF and attach lockout device
  - c. Alternatively unplug power cord and install lock out cap on male end
- 7.10.5. Drill Press IMA128M (#1)
- a. Pull red tab on black control knob
  - b. Attach lockout device
  - c. Alternatively unplug power cord and install lock out cap on male end



- 7.10.6. Manual Lathes #1, #2, #3
  - a. Disconnect power plug and install lockout cap on male end
- 7.10.7. Manual Mills #2, #3
  - a. Disconnect power plug and install lockout cap on male end
- 7.10.8. Drill Press #2
  - a. Disconnect power plug and install lockout cap on male end
- 7.10.9. King Industries Saw
  - a. Located on wall to the right of the saw is an electrical lockout box
  - b. Flip switch to off and install lockout device
- 7.10.10. Fume extract cone
  - a. Two breaker boxes on wall beside fume extract cones. Flip both breakers to off position
  - b. Attach lockout device to both breakers
- 7.10.11. Electrical box wall
- 7.10.12. All other power tools
  - a. Disconnect power plug and install lockout cap on male end

## 8. REVIEW AND RETENTION

This SOP is reviewed annually or whenever deemed necessary by the responsible departmental representative in Risk Management Services.

## 9. DOCUMENT APPROVAL SIGNATURES

Original Approval:

	Author(s)	Facilities Management	Risk Management Services
Name	LBS HSE – Diane Weiler Lockout Steering Committee	-	-
Date	1999/07/13		

Revision:

Name	Jason McLeod	Roger Bizzotto	Mike McGinty
Date	2016/12/08	2016/12/08	2016/12/08

SOE Revision:

Name	David Zinz	Durwin Bossy	Marc Nadeau
Date	2017/11/17		

<b>UBC OKANAGAN GROUP LOCKOUT FORM</b>	Lockout Sheet No.:	
	Associated Switching Order:	
	Lockset Numbers Used:	

Purpose of Lockout:

Procedure Prepared By:	Signature:	Date/Time:
------------------------	------------	------------

Procedure Validated By:	Signature:	Date/Time:
-------------------------	------------	------------

Switching Sequence	Device Designation	Device Designation	Action	Switched and Locked By	Confirmed and Locked By

Worker Name	Signature	Worker Name	Signature

Before Start of Work	After Completion of Work
Lock Box Locked Out:	All Locks Removed:
Seal Number:	Equipment and Workers Clear:

Person-in-Charge Review After Work Complete	Signature	Date/Time

## UBC OKANAGAN LOCK REMOVAL FORM

When it is deemed necessary to have a lock removed by other than the owner of the lock, a formal incident investigation must be completed. This form must be filled out - before the lock is removed - by the immediate qualified supervisor, as per section 7.4 of this procedure. A copy of the completed form signed by the manager must be attached to the incident investigation report.

Date and time: _____
Work order number: _____
Lock number: _____
Lock assigned to: _____
Location of lock: _____

*NOTE: The manager must be contacted, and manager will determine whether a site visit is required to approve the removal of the lock.*

EMERGENCY LOCK REMOVAL PROCEDURE (check YES or NO)		
	YES	NO
1. Immediate qualified supervisor attempts to contact lock owner. Successful?	<input type="checkbox"/>	<input type="checkbox"/>
2. Immediate qualified supervisor attempts to determine reason for lockout. Determined?	<input type="checkbox"/>	<input type="checkbox"/>
3. Immediate qualified supervisor determines if system safe to energize. Safe?	<input type="checkbox"/>	<input type="checkbox"/>
4. (a) Immediate qualified supervisor contacts manager to get approval for work required to make system safe to energize. Approved?	<input type="checkbox"/>	<input type="checkbox"/>
(b) Immediate qualified supervisor contacts manager for permission to remove lock. Permission received?	<input type="checkbox"/>	<input type="checkbox"/>
5. With manager's approval, the qualified supervisor takes necessary steps to ensure it is made safe to remove lock. Safe?	<input type="checkbox"/>	<input type="checkbox"/>
6. In manager's presence and/or with manager's approval (see note above) and in presence of another qualified person, qualified supervisor removes lock. Removed?	<input type="checkbox"/>	<input type="checkbox"/>
7. The Manager notifies employee whose lock has been removed. Notified?	<input type="checkbox"/>	<input type="checkbox"/>

Reason lock was removed: _____
Confirmed safe to remove lock by: _____
Lock removed by: _____
Date: _____      Witness: _____
Date/time lock owner was notified: _____
Qualified Supervisor's Name: _____