1. **Purpose:**
	1. To prevent injury to personnel or damage to property by the unexpected release of hazardous energy. When planning a lockout, it is important to consider the nature of all hazardous energy that may be present.
	2. This Standard is based upon the requirements for U.S. regulations.
2. **Scope:**
	1. This standard applies to all employees, contractors or other persons working on the property. Requirements for work covered under the Electrical Safety Standard may vary from the requirements set forth in this document.
3. **Definitions:**
	1. Blanking or Blinding**:**The absolute closure of a pipe, line or duct by the fastening of a solid plate (such as a spectacle or skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line or duct with no leakage beyond the plate.
	2. Competent person: one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
	3. Danger tag: a tag stating “Danger do not operate” (or similar language). All Energy Control Locks must be accompanied by a Danger Tag.
		1. Personal Locks will be identified by a Danger Tag indicating the identity of the owner
		2. Group/Series Locks will be identified by a Danger Tag indicating the lock series and/or lock box to which it is assigned.
	4. De-energize: The act of isolating the source of energy and removing any residual hazardous energy
	5. Double Block and Bleed**:**The closure of a line, duct or pipe by closing and locking and tagging two (2) in-line valves and by opening and locking and tagging a drain or vent valve in the line between the two (2) closed valves.
	6. Energized: connected to a source of hazardous energy or containing residual or stored energy.
	7. Equipment List:the list of equipment locations to which Energy Isolating Devices and Energy Control Locks must be applied.
	8. Energy Isolating Device: a mechanical device that physically prevents the transmission / release of energy, including but not limited to the following:
* a manually operated electrical circuit breaker;
* a disconnect switch;
* a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently;
* a line valve; a block; and any similar device used to block or isolate energy.

**Note**: Push buttons, selector switches, emergency stops and other control circuit type devices are **NOT** energy isolating devices.

* 1. Group Lockout**:** a form of complex lockout where group/series locks have been applied to the equipment in the field and then the key(s) to the group/series locks are placed in a lockbox. Individuals requiring the protection of the lockout must then place their personal locks on the lockbox
	2. Hazardous Energy: any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, potential or any other energy that could cause injury to personnel or damage to property.
* Electrical hazardsare present when conductors or components that may be electrically energized could cause injury to personnel or damage to property.
* Mechanical hazards are present when the unexpected start-up of the system, equipment, or machine, or the release of stored energy while adjusting, maintaining, or servicing systems, equipment, or machines could cause injury to personnel or damage to property.
* Process hazardsare present when the unexpected release of gases, liquids, or solids could cause injury to personnel or damage to property. These hazards can exist during such tasks as installation, fabrication, servicing, or maintenance of pipelines, vessels, or associated equipment.
	1. Impacted Personnel
		1. Affected person: a person whose job requires the operation or use of machines or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires working in an area in which such servicing or maintenance is being performed.  An affected person becomes an authorized person when that persons duties include performing servicing or maintenance.
		2. Authorized person: a person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment.
		3. Other person: a person who is not an affected or authorized employee but whose job duties or assignment are or could be in the immediate area of a machine or piece of equipment to be isolated.
	2. Isolation: removing machinery or equipment from service and completely protecting against the release of any energy either accidentally or through malfunction of protective devices by: blanking/blinding, misaligning or removing sections of lines/pipes/ducts, a double block and bleed, lockout or tagout of all energy sources, blocking or disconnecting mechanical linkages, releasing any remaining stored energy, etc.
	3. Lock: A device that is used to secure equipment in a desired state
		1. Energy Control Lock: must be a keyed lock, standardized in color, must have only one key, and may only be used for energy control purposes.
			1. Group/Series Lock: a series of energy control locks, keyed alike, with only one key.
			2. Personal Lock: an energy control lock assigned to an individual that is to be used for LOTO purposes. Personal locks must indicate the name of the person placing the lock into service.
		2. Operations Lock: a lock that is standardized in color and used by operations to maintain control of a lockbox. This lock normally has multiple keys that are assigned to responsible persons in an organization and across shifts. This is NOT an energy control lock and it is not permissible to use only this lock for LOTO purposes.
	4. Lockbox: a device that is used to secure the key(s) to the energy control locks that are in place providing isolation on a machine or piece of equipment.
	5. Locking: placing a lockout device on an energy-isolating device at a point of isolation.
	6. Lockout: isolation of a source of hazardous energy, including releasing any residual hazardous energy that might be present, and securing an isolation point by locking it.
	7. Lockout Device: a device that utilizes a positive means such as a lock to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
	8. Lockout Procedure: The written procedure that defines the steps (and sequence of steps if appropriate) for shutting down, de-energizing, locking out, and verifying energy isolation for a specific piece of equipment or system. Procedures are required for all Lockout activities requiring more than one lock.
		1. Lockout procedures shall include an Equipment List
	9. LOTO: Lock Out Tag Out
	10. Tagout: the placement of a tagout device on 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.
	11. Tagout Device: a prominent warning device, such as a tag and a 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.
	12. Testing: when a competent person verifies the absence of hazardous energy.
	13. Verify/verifying: proving the effectiveness of an isolation by attempting to make a machine, system, or equipment operate without being inhibited by interlocks or other means that would impede the “verify” step.
1. **Responsibilities:**
	1. Management has the responsibility to implement this standard.
	2. Supervision must ensure that employees are properly trained and comply with the requirements of this standard.
	3. Employees must understand and comply with the requirements of this standard.
2. **Standards/guidelines**
	1. **Principles**
		1. All sources of hazardous energy shall be identified prior to initiating any lockout/tagout.
		2. All sources of hazardous energy shall be removed or controlled prior to potential exposure to the hazards. Examples of removing or controlling hazardous energy are as follows:
			1. Disconnecting power and discharging any stored energy ( e.g., capacitance)
			2. Isolating pressure sources and releasing the pressure
			3. Stopping rotating devices and securing them from further movement
			4. Releasing stored hazardous energy
			5. Lowering or securing equipment to prevent movement caused by gravity
			6. Protecting equipment from external forces (e.g., wind) that may cause movement
			7. Securing the keys to any truck prior to entering the trailer or climbing on to the bed
		3. Before starting work, each individual working on a task must determine, to his or her satisfaction, that appropriate isolations are in place and that the isolations are secure for the task in which he or she is involved.
		4. Where a lock can be applied, tagout alone shall not be used to control exposure to sources of hazardous energy. Where a lock cannot be applied, site procedures shall address the use of tagout and the additional steps essential to help ensure a level of safety equivalent to that obtained by using lockout. Other means shall be used to secure access to the device, where possible.
		5. Each person potentially exposed to the hazardous energy must participate in the lockout/tagout and must place a lock and tag, when a lock can be applied. Individuals who enter the hazard zone of a lockout shall be considered potentially exposed to the hazard.
		6. Clear communication of the lockout’s/tagout’s status shall be ongoing.
		7. An energy source shall be considered energized until the source is removed and the energy isolation is verified.
		8. An effective verify step must be performed. All interlocks that may prevent an effective verification step must be accounted for. A test for the absence of energy must be performed.
		9. A test for the absence of voltage must be performed for all electrical hazards; for example live, dead, live test.
	2. **Exceptions**
		1. Exception: Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which **provide effective protection**.
		2. Exception: Maintenance activities that require equipment to be energized for trouble shooting or alignment maybe undertaken by qualified individual(s) provided that this work is performed using alternative measures which **provide effective protection.**
3. **Lockout / Tagout procedure**
	1. **Overview**
		1. Each site shall establish written procedures for controlling and methodologies for isolating hazardous energy. The procedures shall include the following information:
			1. How the hazardous energy sources are to be controlled for the duration of the work
			2. Who is responsible for determining that the hazardous energy sources are controlled for the duration of the work
			3. An equipment list detailing the specific locations that require the application of an energy isolating device and energy control lock or tag.
			4. Equipment specific work instruction for all systems having greater than one lock
				1. Note: *Exception:* Written work instruction are not required when **all** of the following exist:

The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shut down which could endanger employees;

The machine or equipment has a single energy source which can be readily identified and isolated;

The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment;

The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;

A single lockout device will achieve a locked-out condition;

The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;

The servicing or maintenance does not create hazards for other employees;

The employer, in utilizing this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

* + - 1. The responsibilities of **all** personnel involved in the work
			2. Mandatory training requirements
	1. **Procedure**
		1. At a minimum, each site’s lockout procedure must include details on the following elements:
			1. Removing the source of hazardous energy and hazardous materials
			2. Addressing exposure to hazards while performing the lockout/tagout
			3. Installing lockout devices
			4. Verifying the equipment to determine that the hazardous energy is under control
			5. Developing a method for helping ensure the continuity of lockouts across shifts
			6. Developing a method for extended duration lockout
			7. Releasing the equipment from lockout
		2. **Removing the source of hazardous energy and hazardous materials**
			1. All personnel who use site lockout procedures must know the following information:
				1. The specific hazardous-energy-isolating devices for the task to be performed
				2. The type of hazardous energy supply or hazardous material
				3. The type and location of the disconnecting/isolating device acceptable for the hazardous energy source or hazardous material
				4. The mechanics and hazards of operating the disconnecting/isolating device
				5. The mechanics of installing a lockout device
				6. When opening a pipe or vessel the Line and Equipment Opening (LEO) standard should be followed.

**Note:** Push buttons, selector switches, emergency stops and other control-circuit type devices are not hazardous-energy-isolating devices.

* + - 1. A method must be used to verify that the hazardous energy source or hazardous material has been removed and that the hazardous energy isolation is complete. In some instances, the “verify” step is sufficient; in other instances, only testing can verify the isolation is complete.
			2. Where hazardous energy can re-accumulate due to system design, configuration, or installation, a means of preventing this re-accumulation must be used. An example of possible hazardous energy re-accumulation is in a long electrical cable that has a high capacitance. When the system or equipment contains a source of stored hazardous energy (e.g., springs, flywheels, gravitational effects, or capacitors), the stored hazardous energy must be relieved or otherwise blocked with components that control the potential hazard. The advisability of installing protective grounds in complex or high-energy electrical systems should be considered.
			3. Fuel-powered, engine-driven equipment (sometimes called portable equipment) must be rendered inoperable by secure means (e.g., by removing the battery cables or removing the spark-plug wire or equivalent).
	1. **Addressing exposure to hazards while performing the lockout/tagout**
		1. PPE appropriate for the hazard (e.g. arc flash gear, acid resistant gear, gloves, etc.) must be used during isolation and de-energization activities
		2. Employees performing lockout and de-energization should perform risk assessments prior to each step to ensure that they are out of the “line of fire”
	2. **Installing lockout devices**
		1. The lockout device must be installed in a way that helps ensure that inadvertent operation of the hazardous-energy-isolating device is impossible.
		2. Each site must define in written procedures the method of controlling or securing the keys for the lockout devices for all lockouts.
		3. Each person potentially exposed to the hazardous energy must place a lock and tag, when a lock can be applied.
	3. **Verifying that the hazardous energy source has been removed**
		1. All isolations shall be verified to determine that the hazardous energy has been removed.
		2. The following are examples of how to verify the removal of hazardous energy sources: opening drains; viewing pressure gauges, site glasses, or level indicators; visually verifying that rotating equipment has stopped; visually verifying that components have been disconnected (e.g., couplings, belts, and chains have been removed); and verifying that stored hazardous energy has been removed or is appropriately blocked.

**Caution:** Gauges should be viewed before the hazardous energy source is removed to confirm they are in working order. Drains can become blocked and not function as designed. When verifying isolations, personnel should take precautions to avoid putting themselves at risk or creating additional hazards.

* + 1. For tasks where there is exposure to electrical hazards, a break in the power conductors should be visually inspected, where possible. All lockouts must include verification of a complete physical break in the power conductors by testing for absence of voltage with a site-approved voltage-detecting device.
	1. **Verifying the equipment to determine that the hazardous energy is under control**
		1. When the equipment is “tried” (i.e., the control device operated) to verify its isolation from sources of hazardous energy or hazardous materials, the area surrounding the equipment shall be cleared of people and equipment that could be injured or damaged prior to attempting to start the equipment. “Verify” procedures must help ensure the isolation of all sources of hazardous energy and the positive control of hazardous materials by verifying to start or move the equipment. The “verify” procedure must also account for all items (e.g., interlocks) that may prohibit the equipment from starting or moving.
	2. **LOTO extending beyond single shift and extended duration lockout**
		1. Where lockouts extend beyond one shift, one of the following systems may be employed to ensure continuity of the lockout.
		2. A personal lock may be permitted to remain in place for the duration of the work period. However, the individual shall verify the lockout is in place after any absence from the work site.
		3. The oncoming personnel place their personal locks onto the energy control device(s) prior to the removal of the off-going personnel removing their personal locks
		4. When a lockbox has been deployed as part of a lockout, an operations lock may be used to ensure continuity of the lockout.
	3. **Releasing the equipment from lockout**
		1. Before the equipment is released back to the owner, the people working on it shall determine that it is safe to reintroduce the hazardous energy or material to the equipment. The equipment’s status shall be conveyed to the owner when the equipment is released from lockout. The owner shall inspect or otherwise verify the integrity of the equipment before hazardous energy or hazardous material is reintroduced. This verification may include leak testing, pressure testing, or simple visual inspection.
		2. Sites shall establish a procedure for authorization the removal of an employee energy control lock. The procedure shall require the approval of the Site Manager or the EHS Manager. (Example form located on SharePoint site.)
			1. Use all reasonable means to contact the absent employee and confirm that the employee does not require the protection of the energy control lock
			2. Once the employee is confirmed to be absent (i.e., not on site) formal written authorization for removing the lock should be obtained.
			3. A person who’s lock has been remove in accordance with this procedure shall be informed immediately on his or her return to work that the lock was removed.
	4. **Equipment Specific Lockout Tagout Procedure Audit**
		1. Each site shall audit annually.
			1. If the established procedure is being followed.
			2. If there are deficiencies in the established procedure.
			3. If there are deficiencies in understanding the established procedure.
	5. **Lockout Types**
		1. Simple lockout
			1. A simple lockout is accomplished by individuals placing personal locks and tags directly on the points of isolation. This is the preferred method of lockout and should be used when appropriate. Simple lockouts shall not require more than 3 locks to be placed in service.
		2. Complex Lockout
			1. Any lockout that does not meet the definition of a simple lockout or is defined as complex by site management due to the hazards or potential impacts of the activity.
			2. A lockbox shall be used for all complex lockouts
			3. An operations lock shall be the first lock on and the last lock removed from the lockbox
	6. **Contractors and Third Parties**
		1. All persons on site potentially exposed to hazardous energy must be protected by LOTO. Each person must have an individual lock and tag in place to achieve full protection.
			1. Where contractors/third parties are working inside of the plant operations they shall adhere to the Energy Control Procedures:
			2. Contractors must use their own regulatory compliant locks and tags.
			3. Contractors working on property at an isolated location (i.e. not inside the operation) may use their own regulatory compliant LOTO system.
				1. Where the contractor interfaces with plant systems (typically electrical or other utilities) they must use the plant energy control procedure.
			4. When multiple contractors are involved in an energy control process in an isolated location they must agree to the use of a single regulatory compliant energy control protocol.
	7. **Energy Control Additional consideration**
		1. Steam systems – Isolation of steam systems in anticipation of Line or Equipment Opening shall use double block and bleed
		2. Natural gas (or other flammable gases) – Isolation of natural gas systems shall include a purge and verify step
			1. Flammable gas purge activities require a risk assessment and written approval by site EHS leader or designate
		3. Confined Space – these spaces require special precautions during LOTO. Please refer to the Confined Space Entry Standard for additional requirements.
	8. **Employee Training and Documentation:**
		1. All impacted persons shall be trained to the degree warranted by their job assignments but in all cases training must be completed at least every 3 years. They shall be retrained whenever their job assignments change or whenever the hazardous energy control procedure changes.
		2. Documentation shall exist for each employee who has been trained. This documentation shall include the following information:
			1. Employee’s name and job assignment
			2. Employer
			3. Date of training
			4. Content of the training received
			5. Name of the person conducting the training
			6. Method of verifying the employee’s understanding of the training
		3. Documentation may be maintained in a computer-based system but should be made available in hard copy form on request.