



Lockout/Tagout Program

The Control of Hazardous Energy

Office of Human Resources

Southwestern Community College

January 2005

Lockout/Tagout Program

Energy Isolation

I. SCOPE

This written program establishes guidelines and procedures for the control of hazardous energy (lockout/tagout), employee training, and periodic inspections per OSHA (Occupational Safety and Health Administration) 29 CFR 1910.147. It shall be used to ensure that all machines and equipment are isolated from all potentially hazardous energy (locked and/or tagged out) during and service and/or maintenance activities where the unexpected energization, start-up, or release of energy could cause injury.

II. APPLICABILITY

This procedure shall apply to all **SOUTHWESTERN COMMUNITY COLLEGE** operations and worksites including contractors, with respect to the control of hazardous energy, during maintenance and/or servicing of equipment.

III. REFERENCE

[29 CFR 1910 Subpart J General Environmental Controls](#)

[29 CFR 1910.147 Control of Hazardous Energy](#)

[29 CFR 1910.301 Subpart S](#)

[29 CFR 1926 Subpart K](#)

[29 CFR 1926.417](#)

General Duty Clause 5(a)(1)

General Duty Clause 5(b)

IV. DEFINITIONS

Affected Employee: An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized Employee: A person who locks or implements a tagout system procedure on machines or equipment to perform the servicing or maintenance on that machine or equipment. An authorized employee and an affected employee may be the same person

when the affected employee's duties also include performing maintenance or service on a machine or equipment that must be locked or a tagout system implemented.

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

Energy Isolating Device: A mechanical device that physically prevents the transmission or 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 slide gate; a slip blind; a line valve; a block; and any similar device used to block or isolate energy. The term **does not** include a push button, selector switch, and other control circuit type devices.

Lockout: The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout device: A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment.

Maintenance and/or Servicing: Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

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.

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.

V. GENERAL

This written program will cover any maintenance and/or servicing activities in which employees may come in contact with machines and/or equipment, where the unexpected energization, start-up or release of energy could cause injury. This program will also apply whenever an employee is required to by-pass a guard, place any part of his or her body into an area on a machine or piece of equipment where work is actually performed (point of operation), or where an associated danger zone exists during a machine operating cycle. This program does not cover normal production operations unless the criteria listed above are met.

Lockout/tagout is a hazardous energy control program used to ensure that machines and equipment are totally isolated from all energy sources (electrical, hydraulic, pneumatic, kinetic, potential, thermal, chemical, and radiation). Locks will be used to secure switches and valves in the OFF or SAFE position. Tags will be attached as a warning device indicating the equipment may not be operated until the tag is removed.

VI. PROCEDURE

- a) This procedure applies to the control of hazardous energy during maintenance and/or servicing of machinery and equipment. Normal production operations are not covered by this procedure. Maintenance and/or servicing which takes place during normal production operations is covered by this procedure only if:
 - 1) an employee is required to remove or bypass a guard or other safety device
 - 2) an employee is required to place any part of his or her body into an area on a machine or piece of equipment at the point of operation
 - 3) where an associated danger zone exists during a machine operating cycle
- b) The exception to this is minor tool changes and adjustments and other minor servicing activities, which take place during normal production operations. These activities include those that are routine, repetitive, and integral to the use of the equipment for production, provided that the work performed uses alternative measures, which provide effective protection for the employee.
- c) This procedure does not apply to work on cord and plug connected electric equipment if the employee has exclusive control of the disconnected cord and plug.
- d) Lockout or tagout devices shall not be used on machinery or equipment that is designated to be removed from service.

VII. ENERGY CONTROL PROGRAM

AUTHORIZATION

Only authorized employees who have been trained in the type and magnitude of the energy, the hazards of the energy, the methods or means of isolating and/or controlling energy, the means of verification of effective energy control, and the purpose of the procedures to be used may begin to perform maintenance or servicing of machinery or equipment under lockout/tagout procedures.

TRAINING

Training will be provided to employees as follows:

1. **Authorized employee:** will be trained in recognition of the type and magnitude of hazardous energy sources, the hazards of the energy, the methods or means necessary for isolating and/or controlling energy, the means of verification of effective energy control, and the purpose of the lockout/tagout procedures to be used. (See Appendix 1)
2. **Affected employee:** will be instructed in the purpose and use of this energy control procedure
3. **Other employees:** those who work in an area where energy control procedures may be utilized shall be instructed about the purpose of this procedure and prohibition on tampering or attempting to restart or reenergize machines or equipment which have been locked out or tagged out.

Training will also be provided concerning the tagout system and the limitations associated with tagouts, including:

1. Only those tags, which have been approved by the college, will be used as a part of the program
2. Tags are warning devices and do not provide the physical restraint that is provided by a lock
3. Tags are to be removed only by the authorized employee responsible for the tags, and they shall never be bypassed, ignored, or otherwise defeated
4. Tags must be legible and understandable to all employees in order to be effective
5. Tags and their means of attachment must be able to withstand environmental conditions encountered in the workplace
6. Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program
7. Tags must be securely attached to energy isolating devices so that they cannot be detached during use
8. Tagout device attachment means shall be non-reusable, attachable by hand, and self-locking with a minimum unlocking strength of no less than 50 pounds
9. A tag shall never be used in place of a lock on an energy-isolating device that is capable of being locked

Employee retraining will be accomplished:

1. Whenever there is change in job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures
2. Whenever a periodic inspection reveals or whenever there are deviations from or inadequacies in an employee's knowledge or use of the energy control procedures
3. To reestablish employee proficiency or to introduce new or revised control methods and procedures

DOCUMENTATION OF TRAINING

Employee name and date of training will be used to document all training. The **SOUTHWESTERN COMMUNITY COLLEGE** Human Resources office in Sylva, North Carolina will maintain records.

HARDWARE AND MATERIALS

Lockout devices must be identified as such and not used for any other purpose. All locks used for energy isolation, LOTO, will be kept in a LOTO box at **SOUTHWESTERN COMMUNITY COLLEGE** identified facilities locations. The Coordinator of Buildings and Grounds or his/her designee is responsible for distribution of the locks and security of keys.

Both lockout and tagout devices must be capable of withstanding environmental conditions in the workplace (locks should not rust or tags deteriorate).

All tagout devices will be standard with "DO NOT OPERATE" warning. [\(See Appendix 2\)](#)

Each authorized employee will receive one lock and one key. The second key will be maintained in a locked supervisory key case in the employee's department.

ENERGY CONTROL PROCEDURES

Application Of Lockout Or Tagout

The following information relates to the steps to be followed before work on equipment or machinery has been started. Application of lockout or tagout shall be performed in the following sequence:

1. **Notification:** before lockout or tagout procedures begin, employees who operate the machine or equipment or those who work in the area around the machine or equipment must be notified that a procedure under lockout or tagout will be performed on their machine or equipment. The notification may be made by the employee performing the work or by a designated **SOUTHWESTERN COMMUNITY COLLEGE** employee.
2. **Preparation for Shutdown:** Before a machine or piece of equipment is isolated, the employee(s) who will perform the lockout or tagout must have the knowledge of the type

and magnitude of the energy, the hazards of the energy to be controlled, the method or means of isolating and/or controlling the energy, the means of verification of effective energy control, and the purpose of the procedures to be used.

3. **Machine or Equipment Shutdown:** The machine or equipment must be shutdown in an orderly fashion in order to avoid any additional or increased hazard(s) to employees or damage to the machine or equipment as a result of the deenergization.
4. **Machine or Equipment Isolation:** All energy isolating devices that are needed to control the energy to the machine or equipment must be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
5. **Applying Lockout or Tagout Devices:** The person(s) performing the lockout or tagout must attach a lockout or tagout device to each energy-isolating device. These devices must be placed in a manner so that they will hold the energy isolating devices in the safe or off position.
 - a) If tagout devices are used, they must clearly indicate that the operation or movement of energy isolating devices from the safe or off position is prohibited
 - b) A tag shall never be used in place of a lock on an energy-isolating device that is capable of being locked
 - c) If a tag cannot be attached directly to an energy isolating device, it must be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device
 - d) (Electrical only) A tag used without a lock (as permitted) shall be supplemented by at least one additional measure that provides a level of safety equivalent to a lock:
 - i) removal of an isolating circuit element
 - ii) blocking of a controlling switch
 - iii) opening of an extra disconnecting device

Stored Energy: Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy must be relieved, disconnected, restrained or otherwise controlled. If there is a danger that the stored energy will reaccumulate to a hazardous level, you must continue to verify isolation until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

Verification of Isolation: Before starting work on a machine or equipment, the authorized employee must verify that the isolation and de-energization of the machine or equipment has been effective. This includes but is not limited to:

- 1) **Mechanical:** Checking the position for valves and blanking lines, utilizing pressure gauges to determine if supply is under pressure or in a vacuum state, and ensuring blocks or other devices are in place to isolate movement.
- 2) **Electrical:** A [qualified person \(definition\)](#) shall use test equipment to test the circuit elements and electrical parts that are exposed to verify that parts are deenergized; determine if any energized condition exists from inadvertently induced voltage or backfeed voltage even though specific circuits are presumed to be deenergized; and if testing over 600 volts nominal, test equipment shall be checked immediately before and after test.

RELEASE FROM LOCKOUT OR TAGOUT

The following information relates to the steps to be followed once the work or activity on equipment or machinery has been completed and the unit is to be placed in service. Release from Lockout or Tagout shall be performed in the following sequence:

- 1) **Inspect the Work Area:** ensure that all non-essential items and employees have been removed or safely positioned, and machine or equipment components are operationally ready.
- 2) **Initial Employee Notification:** before lockout or tagout devices are removed and before machines or equipment are energized, affected employees shall be notified that the lockout or tagout devices are being removed.
- 3) **Removal of Lockout or Tagout Devices:** the employee who applied the device shall remove each lockout or tagout device from each energy-isolating device. If the authorized employee who applied the lockout device is not available to remove it, the device may be removed by the supervisor as long as:
 - a) the authorized employee who applied the device is not in the building
 - b) a reasonable effort is made to contact the employee to advise them of the device removal
 - c) the employee has been advised before they resume work
 - d) the supervisor applies his or her own lock before removing the employee's lock
 - e) the employee's lock is removed using the supervisory key
 - f) the employee's lock is placed in the supervisory lock box and given to the employee at the first opportunity
- 4) **Final Employee Notification:** after lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.

- 5) Follow the machine or equipment's specific startup procedures

NO LOCK WILL BE REMOVED WITH BOLT CUTTERS!

TESTING OR POSITIONING MACHINES AND EQUIPMENT

In situations where lockout or tagout devices need to be temporarily removed from the energy isolating for testing or positioning, the procedure below shall be followed:

- 1) **Inspect the Work Area:** ensure that all non-essential items and employees have been removed or safely positioned, and machine or equipment components are operationally ready.
- 2) **Initial Employee Notification:** before lockout or tagout devices are removed and before machines or equipment are energized, affected employees shall be notified that the lockout or tagout devices are being removed.
- 3) **Removal of Lockout or Tagout Devices:** the employee who applied the device shall remove each lockout or tagout device from each energy-isolating device. If the authorized employee who applied the lockout device is not available to remove it, the device may be removed by the supervisor as long as:
 - a) the authorized employee who applied the device is not in the building
 - b) a reasonable effort is made to contact the employee to advise them of the device removal
 - c) the employee has been advised before they resume work
 - d) the supervisor applies his or her own lock before removing the employee's lock
 - e) the employee's lock is removed using the supervisory key
 - f) the employee's lock is placed in the supervisory lock box and given to the employee at the first opportunity
- 4) **Final Employee Notification:** after lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.
- 5) Energize and proceed with testing or positioning.
- 6) De-energize all systems and proceed with energy control procedures for the application of lockout/tagout.

GROUP LOCKOUT OR TAGOUT

When maintenance and/or service work is performed by more than one employee or in conjunction with another department, group, or contractor, a procedure shall be utilized which affords each employee a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. The following requirements apply for group lockout or tagout:

- 1) When machine or equipment maintenance or servicing involves more than one employee and/or more than one crew (including contractors) or department, one authorized employee must be designated to take primary responsibility to coordinate the affected work and ensure continuity of protection for all.
- 2) The designated employee is responsible to coordinate activities for the entire group to ensure that the Application of Lockout or Tagout procedure and the Release from Lockout or Tagout procedure is followed by each participating authorized employee.
- 3) The designated employee has primary responsibility for providing the group lockout and/or tagout device(s) and all employee notifications.

SHIFT OR PERSONNEL CHANGES

A single authorized employee or the designated authorized employee responsible for group lockout or tagout shall communicate with the oncoming shift personnel to ensure that the continuity of protection is maintained during machine or equipment maintenance or servicing. This procedure is as follows:

- 1) The authorized employee(s) assuming responsibilities on a servicing or maintenance activity currently locked out shall place their lock(s) on all current or existing lockout devices(s).
- 2) The authorized employee(s) leaving the servicing or maintenance activity shall remove their lock(s) from current or existing lockout device(s).
- 3) The oncoming authorized employee(s) assuming responsibilities shall verify that all energy sources have been identified and controlled.

SPECIAL PROCEDURES FOR MULTIPLE ENERGY SOURCES

Where machinery or equipment with multiple energy sources exist, a procedure shall be developed to lockout or tagout these specific machines or equipment. A **Zero Energy State Procedure** (ZESP) is a procedure established for machinery or equipment with two or more energy sources. The ZESP is intended to guide authorized employees through multiple lockout/tagout methods required to achieve a zero energy state. Each ZESP shall include instructions on the existing energy sources and their location, method(s) to isolate the energy, and the steps required to verify that a zero energy state has been achieved.

ZESP Development

Departments possessing machinery or equipment, which utilizes two or more energy sources, shall develop a ZESP for each of these specific machines and equipment.

The Director of Facilities or his/her designee shall develop the ZESP where the machine or equipment exists. [\(See Appendix 3\)](#)

The ZESP will be made available to all authorized employees by attaching the ZESP to its appropriate multiple energy source machine or equipment.

Any machinery or equipment that utilizes two or more energy sources will have a ZESP on file. The ZESP file shall be available for review at all times.

ZESP Procedure for Authorized Employees

In situations where multiple energy source machinery or equipment requires maintenance or servicing, the authorized employee shall follow the procedures listed below:

- 1) **Identification of the ZESP** - before lockout or tagout procedures begin, locate the ZESP on the machine or equipment. If no ZESP is found, the department supervisor shall be notified immediately.
- 2) **Use the ZESP to apply energy controls** - before the energy on machinery or equipment is isolated, review the information on the ZESP so that you are familiar with the type and location of the energy sources, the method to control each energy source, and how to verify that each energy source is isolated. Then, follow the procedure for Application of Lockout or Tagout.
- 3) **Verify that no other energy sources exist** - inspect the machine or equipment to ensure that there are no additional energy sources to be controlled.
- 4) **Perform required servicing or maintenance work.**
- 5) **Release the energy controls** - when the servicing or maintenance work is complete, follow the procedure for Release from Lockout or Tagout.

OUTSIDE CONTRACTORS

Outside contractors will be informed of SOUTHWESTERN COMMUNITY COLLEGE hazardous energy control requirements and are expected to follow the same basic program. SOUTHWESTERN COMMUNITY COLLEGE's designee will coordinate this activity with the contractor. Any contractor who performs work on machinery or equipment at a SOUTHWESTERN COMMUNITY COLLEGE facility, which has the potential of containing or storing hazardous energy will be required to document that their (contractor) employees have been trained in standard lockout/tagout procedures. In addition, the contractor is required to

provide each of their authorized employees with approved lockout/tagout devices. (See Appendix 4)

PERIODIC INSPECTION

Periodic inspections will be conducted, at least annually, to ensure compliance with this program. The Director of Facilities or his/her designee will perform this inspection. The inspection will be conducted to ensure that SOUTHWESTERN COMMUNITY COLLEGE's Hazardous Energy Control procedure and the requirements of 29 CFR 1910.147 is being complied with. If any deviations or inadequacies are identified, retraining shall occur for all authorized employees.

The inspection will be conducted to assess the authorized employee's knowledge of their responsibilities and the procedures under the energy control procedure being inspected. The inspector shall certify that the periodic inspection was completed using the **Lockout Tagout Periodic Inspection** form. The certification will be filed in the Coordinator of Buildings and Grounds office along with comments regarding where problems may exist and/or where additional training may be necessary. (See Appendix 5)

RESPONSIBILITY

College administration will ensure that all employees are trained properly. In addition, the administration and supervisor will be held accountable for enforcing the established work rules for employees to ensure hazardous energy controls are being applied appropriately to eliminate potential exposure to hazardous energy.

Each authorized employee is responsible for performing his or her work in accordance with established safe work practices and precautions outlined in the Control of Hazardous Energy (Lockout/Tagout) program. Failure to comply will result in disciplinary action commensurate with contractual agreement as outlined in the employee's handbook.

Appendix 1

Energy Isolation

The Control of Hazardous Energy (Lockout/Tagout)

Appendix 1 - Training Authorized Employees

Qualified instructors from Blue Ridge Community College EHIS or the **SOUTHWESTERN COMMUNITY COLLEGE** will provide the training for authorized employees. The outline of topics included in the training is as follows:

1. Introduction and purpose
 - a. OSHA 29 CFR 1910.147 and other applicable standards
 - b. **SOUTHWESTERN COMMUNITY COLLEGE** Policy
 - c. Goals and objectives
2. **SOUTHWESTERN COMMUNITY COLLEGE**'s responsibilities
3. Employee responsibilities
4. Lockout/Tagout definitions
5. Energy identification: electrical, hydraulic pressure, pneumatic pressure, other forms of pressure, potential energy, thermal energy, kinetic energy, chemical energy, and radiation.
6. Tag limitations
7. Energy control procedures
 - a. Application of lockout or tagout
 - b. Release from lockout or tagout
8. Testing or positioning machines and equipment
9. Group lockout or tagout
10. Shift or personnel changes
11. Special procedures for multiple energy sources
12. Zero energy state procedures (ZESP)
13. Outside contractors
14. Periodic inspection
15. Responsibility
16. Review of materials

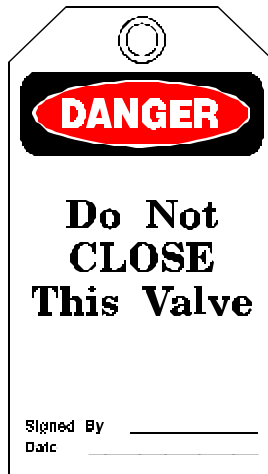
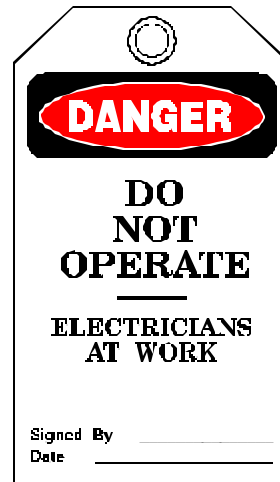
17. Written evaluation

Appendix 2

Energy Isolation
The Control of Hazardous Energy (Lockout/Tagout)
Appendix 2 - Tagouts

The tags shown below have been approved by the SOUTHWESTERN COMMUNITY COLLEGE and shall be used as a part of the Hazardous Energy Control Program. Wording on the tags to warn of hazardous conditions may include:

- 1) DO NOT START
- 2) DO NOT OPEN
- 3) DO NOT CLOSE
- 4) DO NOT ENERGIZE
- 5) DO NOT OPERATE



Appendix 3

Energy Isolation

The Control of Hazardous Energy (Lockout/Tagout)

Appendix 3 - Zero Energy State Procedure

PERFORMING THE EVALUATION

Each department possessing machinery or equipment that will require the use of multiple lockout/tagout methods to achieve a zero energy state, shall develop procedures for the lockout and/or tagout of those specific machines and/or equipment. This *Zero Energy State Procedure* (ZESP) could include any combination of sources such as electrical, hydraulic, pneumatic, potential, thermal, kinetic, chemical, radiation, or other forms of energy.

The following sections contain information regarding the different types of energy sources along with questions to be answered when evaluating machinery or equipment. This will assist supervisors and SOUTHWESTERN COMMUNITY COLLEGE employees in developing ZESPs for multiple energy source machinery and equipment in their departments.

ELECTRICAL (E)

Definition

Electrical energy is a system for moving electrons through wires to perform work. A magnetic field is produced whenever electrons move through a wire. A magnetic field can generate an electric current when the field moves across a wire.

Examples

Examples of electrical energy systems, in addition to line voltage and current, include rectifiers, amplifiers, transistors, motors, circuit panels, lights, controls, computers, heaters, and batteries.

Potential Hazards

Hazards associated with electrical energy include the potential for electrocution and injuries, primarily burns, due to the discharge of current through the body or arcing of the electrical energy.

Questions to Ask when developing a ZESP

Are there one or more sources of electricity serving the machine?

Have the electrical energy source(s) been totally isolated?

- Pulling or locking out the main disconnects
- Breaker panels locked
- Plug-in removed and locked in a can
- Battery back-up disconnected

Has all electrical energy been isolated or bled off?

- Capacitors discharged

Can transformers be energized from welding operations on the load side?

The only positive method of isolating electrical energy is pulling the main disconnect and locking. Breaker panels can be equipped with a door hasp to attain lockout of an individual breaker.

HYDRAULIC PRESSURE (H)

Definitions

Hydraulic energy is a system of pumps, valves, hoses, etc. delivering fluid under pressure to perform work. Hydraulic energy performs work through two major routes: cylinders and pumps.

Examples

Examples of hydraulic energy systems include trash compactors, presses, bailers, and forklifts.

Potential Hazards

Hazards associated with hydraulic energy include the potential for crushing and injuries due to the exposure to high-pressure fluid leaks. Amputation and injection of hydraulic fluid into body tissue are additional hazard potentials.

Questions to Ask when developing a ZESP

Are other sources of hydraulic energy used on this machine?

Have the hydraulic energy source(s) been totally isolated?

- closing all valves
- blocking all lines
- opening all residual accumulators
- blocking cylinders or pumps

Has all residual energy or pressure been isolated or bled off?

Can pressure reaccumulate in the system?

Hydraulics components can create a hazard. Pumps can be started accidentally; accumulators maintain a given pressure within the system; check valves can trap pressure in the system; weight on a cylinder will introduce pressure to the system. Common methods of isolating and locking out pressurized circuits are closing and locking valves, blanking pipes and breaking pipes. After closing and locking a valve, means must be available for bleeding residual pressure from the lines.

PNEUMATIC PRESSURE (A)

Definition

Pneumatic energy is a system of pumps, valves, hoses and cylinders to deliver air pressure to perform work. Pneumatic components create the same type of hazards as hydraulics.

Examples

Examples of pneumatic energy systems include plant air, air operated presses, lifts, air-actuated over-hydraulics, compressors, conveyors, and air powered hand tools.

Potential Hazards

Hazards associated with pneumatic energy include the potential for crushing and injuries due to exposure to high-pressure air. Additional hazards include injection of air into the bloodstream, which can result in crippling and death due to air embolism, as well as injection of particulates into body tissue.

Questions to Ask when developing a ZESP

Are there one or more air systems serving the machine?

Have the pneumatic source(s) been totally isolated?

- closing all valves
- blocking all lines
- opening all residual accumulators
- blocking cylinders or pumps

Has all residual pressure been isolated or bled off?

Can pressure reaccumulate in the system?

OTHER FORMS OF PRESSURE (OP)

Definition

Other mediums that can create pressure within lines and machinery similar to hydraulic and pneumatic systems.

Examples

Examples of other forms of pressure systems are gases (hydrogen, nitrogen, carbon dioxide, acetylene, oxygen), natural gas (boilers, cafeteria equipment), water (domestic water supply, heat exchangers, chilled water, return water supply), or steam (boilers, heaters, steam traps, heat exchangers, presses or lifts).

Potential Hazards

Hazards associated with other forms of pressure include the potential for crushing and injuries due to exposure to the medium. Hazards from various media can include thermal burns, fire, asphyxiation, and injection of the medium into the body tissue and/or bloodstream.

Questions to Ask when developing a ZESP

Are there one or more pressure systems serving the machine?

Have all sources of pressure been totally isolated?

- closing all valves
- blocking all lines
- opening all residual accumulators
- blocking cylinders or pumps

Has all residual pressure been isolated or bled off?

Can pressure reaccumulate in the system?

POTENTIAL ENERGY (PE)

Common methods of controlling potential energy are blocking, pinning, chaining, or lowering.

Definition

Simply defined, potential energy is the energy at rest or due to position.

Examples

Springs (S) held in compression or under tension, pins, linkage, hydraulics, pneumatics, vacuum and magnetic systems can release the positioned components and allow them to move. Gravity (G) by the failure of springs, pins, linkage, etc. can cause machine components or materials to fall (dump trucks, forklifts).

Potential Hazards

Hazards associated with potential energy include the uncontrolled release of this energy, which can cause machinery components or materials to go ballistic and cause punctures or penetration injuries, dismemberment, or caught between situations.

Questions to Ask when developing a ZESP

Is there one or more springs, pins, linkage systems, chains, etc., serving the machine?

Have all sources of potential energy been totally isolated, removed or blocked?

THERMAL ENERGY (TE)

Definition

Thermal energy is the motion of particles at the molecular or particulate level. It involves both hot and cold systems and the transfer of this energy through mediums.

Examples

Welding, torch work, chemical reactions, heat exchangers, environmental chambers, boilers, and cryogenic systems. SOUTHWESTERN COMMUNITY COLLEGE has established 113° F and 39° F as action levels for employees. Temperatures above 113° F and below 39° F can cause serious and severe damage to human tissue.

Potential Hazards

Hazards associated with thermal energy are burns, heat stress, or frozen tissue.

Questions to Ask when developing a ZESP

Must the employee work in close proximity to the heat or cold?

Are means available to bring the temperatures above or below the action levels?

Is appropriate personal protective equipment (PPE) available for use?

KINETIC ENERGY (KE)

Definition

Kinetic energy is the energy of machinery or equipment due to its motion.

Examples

Rotating flywheels and spinning shafts create both a contact hazard and point of operation hazard (a spinning flywheel on a press could cause a press cycle when working on the clutch controls).

Potential Hazards

Hazards associated with forms of kinetic energy include *caught in*, *caught on*, and *caught between* situations for employees.

Questions to Ask when developing a ZESP

Has all energy of motion been stopped?

Are means available to block spinning or rotating machine or equipment parts to prevent them returning to motion?

CHEMICAL ENERGY (CE)

Definition

Chemical energy is the energy associated with chemical reactions such as decomposition, synthesis, or replacement reactions.

Examples

The plating tanks and associated piping and chemical storage tanks.

Potential Hazards

Heat of reaction, uncontrolled reactions, fires and explosions are the primary hazards with chemical energy.

Questions to Ask when developing a ZESP

Have pipes and tanks been blocked and/or bled?

Have system tanks and piping been purged or inerted?

Has the residual chemical been neutralized or inactivated?

RADIATION (R)

Definition

The emission and propagation of waves or particles.

Examples

X-ray units, LASERS

Potential Hazards

Irradiation or exposure to alpha, beta, or gamma particles, which can cause radiation, burns, radiation sickness, and death.

Questions to Ask when developing a ZESP

Is there a radiation source associated with this machine or equipment?

What is the type of radiation?

Is PPE available for alpha or beta exposure?

Appendix 4

Energy Isolation

The Control of Hazardous Energy (Lockout/Tagout)

Appendix 4 - Contractor Obligations

Any contractor who performs work on machinery or equipment at a **SOUTHWESTERN COMMUNITY COLLEGE** worksite which has the potential of storing or containing hazardous energy, will be required to document that their (contractor) employees have been trained in standard lockout/tagout procedures.

In addition, any contractor who performs work on machinery or equipment which has the potential of storing or containing hazardous energy, will be required to provide each of his employees with approved lockout/tagout devices.

Appendix 5

Energy Isolation

The Control of Hazardous Energy (Lockout/Tagout)

Appendix 5 - Periodic Inspection

1. A periodic inspection of the energy control system will be conducted on an annually basis to ensure compliance with **SOUTHWESTERN COMMUNITY COLLEGE**'s hazardous Energy Control procedure and the requirements of 29 CFR 1910.147.
2. The Coordinator of Buildings and Grounds or his/her designee will conduct the inspection. The Maintenance Department may also perform periodic inspections.
3. A review will be held with a sufficient number of employees to assess the knowledge of the authorized employees of their responsibilities and procedures under the energy control procedure being inspected.
4. The Coordinator of Buildings and Grounds or his/her designee shall certify that the periodic inspection was completed. The **Lockout Tagout Periodic Inspection** form in this appendix will be used to perform the periodic inspection.
5. The certification will be filed in the Coordinator of Buildings and Grounds **SOUTHWESTERN COMMUNITY COLLEGE** office along with comments regarding where problems may exist and/or additional training may be required.

LOCKOUT/TAGOUT PERIODIC INSPECTION

Date: _____ Time: _____
Name of Inspector: _____ Title _____
Machine or Equipment: _____
Location: _____
Maintenance/Services Conducted: _____

Authorized Employee(s): _____
Affected Employee(s): _____

INSPECTION PROCEDURE

1. General review of responsibilities and procedures *Satisfactory*
(See LO/TO Procedure Card) ___ Yes ___ No
Comments: _____

2. Knowledge of machine/equipment energy types *Satisfactory*
___ Yes ___ No
List Energy Types: _____
Comments: _____

3. Knowledge of machine/equipment control methods *Satisfactory*
___ Yes ___ No
List required controls: _____
Comments: _____

4. Other comments or deficiencies identified: _____

5. Recommend refresher training? ___ Yes ___ No

CERTIFICATION

I hereby certify that an inspection was performed on the Lockout/Tagout procedure utilized by the employee(s) indicated above on the aforementioned machine and/or equipment to ensure the procedure and requirements of OSHA 29 CFR 1910.147 (Control of Hazardous Energy Lockout/Tagout) are being satisfied. The findings of this inspection have been reviewed with the employee(s) performing the servicing and/or maintenance work being inspected.

Inspector: _____	Date: _____
Authorized employee(s): _____	Date: _____
_____	Date: _____
_____	Date: _____
_____	Date: _____

UPON COMPLETION SEND TO: The Office of Human Resources

Additional Information

[Authorized Employee LOTO Annual Certification](#)

[Boiler Steam Burn](#)

[Elevator Fatality](#)

[Hazardous Energy Source Lockout](#)

[Lockout Fact Sheet](#)

[Lockout Tagout](#)

[Control of Hazardous Energy LOTO Link](#)

[LOTO Audit](#)

[LOTO Survey](#)

[Lockout Tagout Interactive Training Program Link](#)

[Supervisors LOTO safety checklist](#)

Periodic Inspection and Program Review

[Annual Lockout Review](#)

[Lockout Tagout Inspection](#)

[Lockout Tagout Periodic Inspection](#)

[Periodic Inspection](#)

[Periodic LOTO Observation](#)

PDF Handouts

[6 Step for Lockout Tagout](#)

[How Many Locks and Tags](#)

[Lockout Tagout](#)

[Piping Lockout - Tagout 1](#)

[Piping Lockout - Tagout 2](#)

[Removing Lockout Tagout](#)

[Types of Hazardous Energy](#)