

Lockout/Tagout Electrical Safety Program



Environmental Health, Safety, and Risk Management Department

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I. PURPOSE

The purpose of this program is to ensure the safety of Stephen F. Austin State University (SFA) employees by eliminating the accidental energizing of electrical equipment or release of stored energy, which could cause injury or death to employees while performing maintenance on machines and equipment. This program provides procedures that will be used by employees who perform electrical or mechanical work on various machines and equipment. This safety program has been established in compliance with Occupational Safety and Health Administration (OSHA) regulations set forth in 29 CFR 1910.147, The Control of Hazardous Energy (lockout/tagout).

SFA maintenance staff perform service and maintenance on machines and equipment throughout the main campus and off campus facilities. This lockout/tagout program consists of energy control procedures designed to enhance employee safety and protection from an unexpected energy source or release of stored energy when servicing or maintaining machines and equipment. Some machines also have gas, air, hydraulics, steam, or other power sources. These areas must also be locked in a safe position.

II. DEFINITIONS

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

Authorized Employee: A person who implements a lockout/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 piece of equipment involving a lockout/tagout system procedure.

Energy Source: Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

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

Tagout: The placement of a tagout device on an energy-isolating mechanism, in accordance with an established procedure, which indicates that the equipment, and the mechanism, may not be operated until the tag out device is removed.

Lockout Device: A device that utilizes a positive means, such as a lock, to hold an energy-isolating mechanism in the safe position and prevent the energizing of a machine or piece of equipment.

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

III. RESPONSIBILITIES

A. Environmental Health, Safety and Risk Management (EHSRM)

1. Maintain the written lockout/tagout Electrical Safety Program;
2. Retain all program records as required by OSHA and SFA's record retention policy;
3. Assist with lockout/tagout electrical safety training; and
4. Periodically inspect lockout/tagout electrical operations to ensure compliance.
5. Temporarily suspend work or close a job site if the safety practices and procedures described in this program are not in place or an immediate hazard is observed.

B. Department/Shop Supervisors

1. Be familiar with the lockout/tagout electrical safety procedures described in this manual;
2. Ensure employees are trained and use proper lockout/tagout procedures;
3. Provide proper personal protective equipment (PPE) to employees as needed;
4. Provide lockout/tagout safety equipment needed for the work being performed;
5. Periodically inspect equipment work sites for safe work practices;
6. Perform removal of locks and tags when the employee who installed them is unable to perform the task.
7. Ensure employees conducting the work comply with OSHA 29 CFR 1910.147 as described in this program.

C. Authorized Employees

1. Complete the required lockout/tagout electrical safety training and comply with all procedures in this program;
2. Use all PPE and equipment in the correct manner;
3. Notify your supervisor if PPE or safety equipment is needed;
4. Notify your supervisor or EHSRM immediately if a safety hazard is observed; and
5. Never remove a lockout/tagout device that you did not install.

D. Contractors

1. Implement the program that is compliant with the SFA lockout/tagout program and OSHA regulations, and ensure that the personnel under their supervision are trained in accordance with the procedures established by this program.
2. Ensure appropriate notifications and coordination with other campus departments/personnel are accomplished.

IV. LOCKS

Each authorized SFA employee will be provided an individually keyed lock, and a single key by their department.

Contractors will supply their own locks, and manage their program in accordance with procedures in Appendix A of this document.

V. TRAINING

Initial and periodic training shall be provided by EHSRM Safety Officers and/or department/shop supervisors to ensure authorized and affected employees understand the procedures described in this Lockout/Tagout Electrical Safety Program. Training will cover the OSHA standard on The Control of Hazardous Energy (lockout/tagout) and the procedures described in this written program.

Contractor compliance will be maintained through training and documentation. The program training includes the topics below.

Training topics for Authorized Employees will include:

- Recognition of potentially hazardous energy sources in work areas;
- Proper lockout/tagout procedures; and
- Proper use of lockout/tagout devices and related equipment.

Training topics for other affected employees will include:

- Purpose and use of lockout/tagout procedures;
- How to recognize lockout/tagout equipment; and
- Risk and repercussions of tampering with lockout/tagout equipment.

Retraining of employees will be conducted when:

- An employee's job duties change related to lockout/tagout;
- The Lockout/Tagout Electrical Safety Program procedures change;
- Changes involving electrical/equipment hazards arise, such as new equipment, modified processes, or the use of different lockout/tagout devices; or
- Periodic inspections show employee deficiencies in energy control techniques.

The following sections describe the required procedures needed to perform service and maintenance on equipment that could pose a safety risk to employees.

VII. LOCKOUT/TAGOUT PROCEDURES

A. Job Safety Analysis

SFA maintenance and shop supervisors assigning employees to service and maintenance machines or equipment with the potential for an unexpected energy source or release of stored energy will be required to complete a hazard review. The job safety analysis (JSA) form is located in Appendix B of this document. The purpose of the JSA analysis is to identify the hazardous energy sources associated with repair, maintenance, cleaning, or the operation of machines/equipment. The JSA will determine the location of hazardous energy sources such as but not limited to the following:

- Electricity
- Pneumatic
- Hydraulic
- Natural gas
- Gasoline/diesel fuel
- Mechanical
- Springs
- Water pressure
- Chemical
- Steam
- Thermal
- Radiation

B. Documenting Hazards and Procedures

Supervisors may utilize the JSA to distribute information to affected employees, and develop specific procedures as needed. The documented procedures may include, but are not be limited to the following elements:

- Machine/equipment name or type and location,
- List of affected employees and how they were notified of equipment shut down & lockout/tagout,
- Identify single or multiple energy sources,
- List of hazardous energy sources and location of the shut off or isolation,
- Type and location of lockout/tagout devices to be used,
- Requirement and process for dissipation, restraining, or relieving of stored or residual energy,
- Method for verifying isolation of the energy source(s), and
- Steps necessary for restoring equipment to service after the work requiring lockout/tagout is completed.

An example of a specific lockout/tagout procedure is provided in Appendix C at the end of this written program and may be modified by department supervisors to best fit the needs of the specific equipment being worked on.

D. Lockout Procedures

The responsible Department will provide and maintain all lockout/tagout devices determined to be appropriate for the protection of employees.

The following lockout procedures must be followed each time a piece of equipment is shut down for maintenance:

1. Notify all affected employees who use or work in the area where the equipment will be locked out for service. Affected employees should be notified that power or other energy source will be turned off, the reason for the maintenance, affected equipment or electrical systems, and the anticipated date and time when the power will be restored.
2. Shut down equipment using normal stopping procedures.
3. Identify equipment energy isolation points.
4. Release any stored energy for equipment.
5. Each SFA authorized employee will place their supplied lock on the main switch or breaker and the person doing the repair work will maintain possession of the key.
6. Locked equipment must also be tagged out. Tags shall not be used as a replacement for locking out. The point-of-operation switch would be the best place for the tag; but if this is not possible, place the tag where the machine operator can see it easily; also place the tag at the panel disconnect.
7. After ensuring that no personnel are exposed, test the locked-out main breaker switch by trying to close the circuit breaker with the lock in place.
8. Test the circuit to assure it is de-energized by closing the local switch to see whether the equipment starts. Then return the switch to the off position. Use the proper equipment to test the circuit for power and verify the energy source is off.
9. If more than one maintenance person is working on a piece of equipment, a multi lock hasp should be used and each employee should secure their own lock on the hasp to ensure safety until all work has been finished on the equipment. See the "Group Lockout/Tagout Work" section on page 8 for more detailed information.
10. If the machine has air, hydraulic, gas, steam, water pressure or other sources of energy that would pose a danger to the employee performing work on the equipment, these controls should also be locked or secured in an off or zero-movement position. If tied off sources are in a place that they could be untied easily by an unknowing operator, a tag must be placed at the point they are tied.
11. In the case of an open panel, a tag should be placed on the disconnect inside the panel, and if the equipment is left alone for any reason, the panel should be shut and locked.
12. Tags should never be removed by unauthorized persons. Only a maintenance person or maintenance supervisor may remove tags upon completion of work. Any violations of this program will be subject to disciplinary action.
13. Routine work such as performing cleaning and lubricating of machines or equipment could, if energized, cause injury. During operations where accidental starting of machines or equipment creates a safety hazard, it is necessary for the employee to lock out the equipment to prevent injury.

F. Tagout Procedures

In some instances, it may be necessary to perform work on equipment that is energized. If it is not possible to eliminate the power source, tags must be placed at all stations that could make the equipment active. Tagout procedures and devices will ONLY be utilized if the energy source will not accept a lockout device or it is absolutely not possible to eliminate the energy source. When possible, equipment should be retrofitted to accept lock out devices. If this is not possible, whenever existing machines or equipment are scheduled to be replaced, renovated, modified or replaced, energy isolating devices for machines and equipment will be designed to accept a lockout device.

Note: Tagout procedures have limitations on the amount of hazard reduction they provide. tagouts are considered to be a warning device and provide limited or no physical restraint.

When lockout of the power source is not possible, the following tagout procedures must be followed each time a piece of equipment is shut down for maintenance:

1. Tagout devices must be affixed in such a manner to clearly indicate that the operation or movement from the "safe" or "off" position is prohibited.
2. When tagout devices cannot be affixed directly to the energy isolating device (switch), in the position where a lockout device would normally be attached, the tagout will 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.
3. Tags must be legible and employees whose work is affected or may be affected by the tagout procedure must be informed and understand the tagout procedures.
4. Tags must be durable and able to withstand the elements to which they will be exposed. They should be securely attached to prevent accidental removal during use.
5. Tagout devices must warn employees of the potential hazard associated with the tagout event and display information such as; "**DO NOT OPEN**", "**DO NOT START**", "**DO NOT CLOSE**", "**DO NOT ENERGIZE**", "**DO NOT OPERATE**".
6. Tagout devices must indicate the name of the employee who applied it and the date when it was applied.
7. Tagout devices must be standardized for color, shape, size, print and format.
8. Employees must implement additional safety measures such as, but not limited to, removal of valve wheels, removal of an isolating circuit, blocking of control switches, or opening an extra disconnect switch when utilizing the tagout procedure to reduce or limit the accidental reenergizing of an electrical or other energy source.

NOTE: Removal of a lockout or tagout device by any employee other than the installer is prohibited unless specifically communicated by the supervisor in the work procedure for that particular equipment. Any unauthorized removal of a lockout or tagout device will be subject disciplinary action.

Figure 1: Examples of Lockout/Tagout Devices



H. Group Lockout/Tagout Work

When service and/or maintenance is performed by a crew or group of employees, additional steps should be taken to ensure the safety of all employees working on the equipment or system. Group Lockout/Tagout may include employees from other campus departments or workers from other companies conducting work on SFA facilities. Group Lockout/Tagout will include the following procedures:

1. A multi-lock accepting hasp (pictured in figure 1 above) will be placed on the energy isolating device by the lead Authorized Employee.
2. Each employee working on the equipment will place their personal lock on the multi-lock hasp before beginning work.
3. When all service and/or maintenance work is complete, each employee shall remove their lock. The supervisor or designated employee will ensure that the equipment is free and clear of obstruction and all employees have moved to a safe distance for full operation of the equipment.
4. The lead supervisor or designated employee will then remove the multi-lock accepting hasp. The equipment is ready to be re-energized.

I. Incomplete Work

In the case where work is not completed at the end of the work shift or if the maintenance person is moved from the job before the work is complete, his personal lock must remain in place until the work is complete. The supervisor must be notified and the night or on-call maintenance personnel must be informed. At this time a decision must be made on how this lockout would affect normal operations and business functions.

J. Removal of Lockout/Tagout Devices and Restoring Equipment to Service

Lockout and tagout devices attached to an energy source must be removed only by the authorized employee who applied the device unless specifically authorized by the supervisor.

Follow these steps to complete the lockout/tagout removal process and restore the equipment to service:

1. Inspect the work area to ensure all non-essential items such as tools or equipment have been removed to a safe distance and the equipment components are operationally ready to restart.
2. Verify all controls are in the neutral/off position.
3. Check to make sure all employees are safely positioned or removed from the area.
4. Remove the lockout/tagout device and reenergize the equipment.
5. Notify the affected employees of the return to normal operation of the equipment.

VIII. ELECTRICAL SAFETY TIPS

The following safety tips give some basic guidance on minimizing risks related to electrical hazards:

- Unless it is a part of your regular job, don't attempt to repair or adjust any electrical equipment.
- Treat all electric wires as live wires. **DO NOT TOUCH DANGLING WIRES.** Report them immediately to your supervisor or EHSRM at extension 6034.
- All motors, fuse boxes, switch boxes, and other electrical equipment must be provided with a ground. (Except as noted in the National Electric Code NFPA-70).
- Ground wires leading from electrical apparatus must not be disconnected or broken.
- When working with electric portable tools, especially when in damp places, check the insulation or extension cords for damage.
- Never use equipment with cords that are damaged in any way.
- Disconnect electrical service to electrical driven machinery and lockout or tagout according to the procedures described in the previous sections.
- Voltages lower than 110 will cause death under certain conditions. For this reason, all electrical sources, no matter the voltage, must be considered as extremely hazardous.
- Individual disconnect switches must be provided for each permanent machine.
- Temporary wiring will be installed only by authorized personnel. Such wiring must be replaced with permanent installations or removed within 90 days. See National Electric Code NFPA-70.
- Only authorized personnel will repair and/or install electrical equipment.
- Until properly grounded or locked out; dead electrical circuits shall always be treated as live circuits.
- All electrical panels must be kept clear of obstructions at all times. A minimum of 36-inch clearance is required on all sides of electrical panels.
- The makeup or use of an extension cord with a male connector at each end is prohibited.
- The use of "homemade" extension cords is prohibited. Only UL listed extension cords are allowed for use on campus.
- The use of extension cords in excess of their rated capacity is prohibited.
- Extension cords should be kept off the floor where possible. Extension cords will not be run across passageways without protection. Do not run cord under carpeting.
- Extension cords are only allowed for temporary use (not as a permanent power source) and must be picked up and stored at the end of each work shift.
- It is recognized that the testing of voltages, or the checking or calibrating of circuits may require that the equipment be electrically energized. Under these conditions, extreme caution must be taken.
- Capacitors might contain a stored charge. For this reason, they should be discharged and checked for charge through the use of a suitable insulated short circuit jumper or shorting bar.
- Electrical tools or equipment will not be used in an area where there are flammable vapors or gases, unless such electrical tools or equipment is UL approved as explosion proof.

IX. INSPECTIONS

Maintenance, Shop, or Departmental Supervisors should conduct inspections to ensure their employees are utilizing safe work practices while performing lockout/tagout operations. Additionally, EHSRM Safety Officers may conduct periodic inspections of work areas to ensure the procedures and requirements of the Lockout/Tagout Electrical Safety Program are being followed. In doing so, EHSRM may temporarily suspend work or close a job site if the safety practices and procedures described in this program are not in place or an immediate hazard is observed.

Appendix A: SFA Lockout/Tagout Procedure



STEPHEN F. AUSTIN STATE UNIVERSITY

LOCKOUT TAGOUT

According to **OSHA**, following proper lockout/tagout procedures prevents an estimated **120 fatalities** and **50,000 injuries** each year. Learn how to lock out/tag out and avoid unnecessary risk.

1



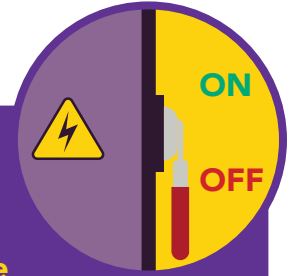
Notify all employees about the required lockout.

2



Shut down equipment using normal stopping procedure.

3



Locate and isolate equipment from all energy sources.

4



Release any stored energy.

5



Lock out all switches and controls with assigned locks and tags.

6



After ensuring that no personnel are exposed, use the normal operating controls to make sure equipment won't operate. **Return equipment to "off" state after test.**

7



Perform servicing.

8



Remove the lockout device.

9




Once work is completed, **notify all employees.**

From Electrical Safety Foundation International, esfi.org

For questions, contact SFA Environmental Health, Safety and Risk Management at safety@sfasu.edu or (936) 468-4514.

Appendix B: Hazard Analysis Form

JOB SAFETY ANALYSIS	
EHSRM JSA No.	 STEPHEN F. AUSTIN STATE UNIVERSITY Environmental Health, Safety and Risk Management
Job/Operation Title:	
Department:	New <input type="checkbox"/> Revised <input type="checkbox"/>
Location(s):	Date:
Person(s) Performing This Job (Circle all that apply): Students Faculty Staff Contractors Volunteers Other	Developed By:
	Reviewed By:
	Supervisor:

POTENTIAL HAZARDS OF THIS JOB		
Task/Step	Hazards	Controls
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Required Training:	Required PPE:
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Contact Information	
CALL 9-11 IN CASE OF EMERGENCY	
University Police Department.....	(936) 468-2608
Environmental Health, Safety and Risk Management	(936) 468-6034

Instructions

Questions to Consider:		Describing the Hazard Scenarios
What can go wrong? What are the consequences? How could it arise? What are the other contributing factors? How likely is it that the hazard will occur?		Where is it happening (environment) Who or what it is happening to (exposure) What precipitates the hazard (trigger) The outcome that would occur should it happen (consequence) Any other contributing factors (time of day, weather,)
Major Hazards	Hazard Controls	JSA Category Descriptions
Chemical (Toxic) Chemical (Flammable) Chemical (Corrosive) Chemical (Reaction) Explosion (Over Pressurization) Electrical (Shock/ Short Circuit) Electrical (Fire) Electrical (Static/ESD) Electrical (Loss of Power) Ergonomics (Strain) Ergonomics (Human Error) Excavation (Collapse) Fall (Slip, Trip) Fire/Heat Mechanical/ Vibration (Chaffing/Fatigue) Mechanical Failure Mechanical (General) Noise Radiation (Ionizing) Radiation (Non-Ionizing) Struck By (Mass Acceleration) Struck Against Temperature (Heat/Cold) Visibility Weather	<p>Engineering:</p> <ul style="list-style-type: none"> Eliminate/minimize or remove the hazard Enclosure of the hazard Isolation of the hazards (guards, shields etc) Removal or redirection of the hazard <p>Administrative:</p> <ul style="list-style-type: none"> Written operating procedures, work permits and safe work practices Exposure time limitations (temperature/noise) Monitoring the use of highly hazardous materials Alarms signs and warnings Buddy system Advance training <p>Personal Protective Equipment</p>	<p>Sequence of Job Steps: Break the job down into steps. Each of the steps of a job should accomplish some major task. The task will consist of a <i>set</i> of movements. Look at the first <i>set</i> of movements used to perform a task, and then determine the next logical set of movements. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. How does that break down into job steps? Picking up the box from the conveyor and putting it on a hand-truck is one logical set of movements, so it is one job step. Everything related to that one logical set of movements is part of that job step. Be sure to list all the steps in a job. Some steps might not be done each time but, that task is a part of the job as a whole, and should be listed and analyzed.</p> <p>Potential Hazards: Identify the hazards associated with each step. Examine each step to find and identify hazardous actions, conditions and possibilities that could lead to an accident. It's also important to look at the entire environment and discover every conceivable hazard that might exist. Be sure to list health hazards as well even though the harmful effect may not be immediate. It's important to distinguish between a hazard, an accident and an injury. Each of these terms has a specific meaning: HAZARD-A potential danger. Oil on the floor is a <i>hazard</i>. ACCIDENT-An unintended happening that may result in injury, loss or damage. Slipping on the oil is an <i>accident</i>. INJURY-The <i>result</i> of an accident. A sprained wrist from the fall would be an injury. Some people find it easier to identify possible accidents and illnesses and work back from them to the hazards. If you do that, you can list the accident and illness types in parentheses following the hazard. But be sure you focus on the <i>hazard</i> for developing recommended actions and safe work procedures.</p> <p>Recommended Controls or Procedure: Using the first two columns as a guide. Decide what actions are necessary to eliminate or minimize the hazards that could lead to an accident, injury, or occupational illness. Among the actions that can be taken are: 1) engineering the hazard out; 2) providing personal protective equipment; 3) job instruction training; 4) good housekeeping; and 5) good ergonomics. List recommended safe operating procedures on the form, and also list required or recommended personal protective equipment for each step of the job. Be specific.</p>

Appendix C: Specific Procedure Example

SFA Lockout/Tagout Procedure

1. List the name/type and location of the equipment to be shut down for maintenance:

2. List affected employees and identify how they were notified that service/maintenance is required and the machine/equipment is scheduled for shut down and lockout/tagout:

3. Does the equipment have a single energy source or multiple energy sources?

4. List the hazardous energy sources associated with the equipment and the location of the shut off or isolation of energy sources. (example: electrical, shut off at breaker panel or natural gas, shut off at gas valve behind machine):

5. Appropriately secure all sources of energy. List the type and location of lockout/tagout device(s) to be used:

6. Is dissipation, restraining, or relieving of stored or residual energy required? If so, how will this be accomplished?

7. Confirm/verify energy sources have been isolated.

Caution: return all operating control(s) to the off/neutral position.

List the method to be used to verify the isolation of energy sources (e.g. voltmeter):

RESTORING EQUIPMENT TO SERVICE

1. Inspect the work area to ensure all non-essential items such as tools or equipment have been removed to a safe distance and the equipment components are operationally ready to restart.
2. Verify all controls are in the neutral/off position.
3. Check to make sure all employees are safely positioned or removed from the area.
4. Remove the lockout/tagout device and reenergize the equipment.
5. Notify the affected employees of the return to normal operation of the equipment.