

**EMBRY-RIDDLE AERONAUTICAL UNIVERSITY**

**COMPREHENSIVE SAFETY**  
**PLAN**

9. SUBJECT: Lockout/Tagout



**“Safety is a judgment about the acceptability of risk?”**

**9. SUBJECT:** Lockout/Tagout (Control of Hazardous Energy Sources).

**REGULATORY STANDARD:** OSHA - 29 CFR 1910.147

**BASIS:** Approximately three million workers in the United States on a daily basis, face extreme risk from uncontrolled energy when servicing machinery. Serious injury or death can be the result. Typical non-lethal injuries include fractures, lacerations, contusions, amputations, puncture wounds, electric shock, and falls. The average lost time for injuries runs approximately 24 days. The Occupational Safety and Health Administration (OSHA) estimates that approximately 120 fatalities and approximately 28,000 serious and 32,000 minor injuries each year could be prevented if proper lockout/tagout procedures at job sites are initiated. This poses a serious problem for exposed workers and their employer. The OSHA Control of Hazardous Energy Sources Standard establishes uniform requirements to ensure that the hazards of uncontrolled energy in U.S. workplaces are evaluated, safety procedures implemented, and that the proper hazard information is transmitted to all affected workers.

**GENERAL:** Embry-Riddle Aeronautical University will ensure that all machinery meeting the criteria for lockout/tagout within our facility(s) are evaluated, and that information and training programs, and lockout/tagout procedures are implemented. This standard practice instruction is intended to address comprehensively the issues of; evaluating and identifying potential uncontrolled energy sources, evaluating the associated potential hazards, communicating information concerning these hazards, and establishing appropriate procedures, and protective measures for employees.

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## **Embry-Riddle Aeronautical University Lockout/Tagout Program**

**1. Written Program.** Embry-Riddle Aeronautical University will review and evaluate this standard practice instruction on an annual basis, or when changes occur to 29 CFR 1910.147, that prompt revision of this document, or when facility operational changes occur that require a revision of this document. Effective implementation of this program requires support from all levels of management within this company. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of the number of workers employed or the number of work shifts. It is designed to establish clear goals, and objectives.

**2. General Requirements.** Embry-Riddle Aeronautical University will establish lockout/tagout procedures through the use of this document. This standard practice instruction covers the servicing and maintenance of machines and equipment in which the unexpected energization or start up of the machines or equipment, or release of stored energy could cause injury to employees.

2.1. Application. This instruction applies to the control of energy during servicing and/or maintenance of machines and equipment. Normal production operations are not covered. Servicing and/or maintenance which takes place during normal production operations is covered if:

2.1.1 An employee is required to remove or bypass a guard or other safety device.

2.1.2 An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

Exception: Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered 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 in accordance with company operational procedures.

2.1.3 This instruction does not apply to the following:

2.1.3.1 Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

2.1.3.2 Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided it is demonstrated that (1) continuity of service is essential; (2) shutdown of the system is impractical; and (3) documented company procedures are followed, and special

equipment is used which will provide proven effective protection for our employees.

**3. Program Implementation.** The University will establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employees.

3.1 Energy control program. The University shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start up or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source, and rendered inoperative.

3.1.1 Tagout. If an energy isolating device is not capable of being locked out, The University's energy control program shall utilize a tagout system.

3.1.2 Lockout. If an energy isolating device is capable of being locked out, The University's energy control program shall utilize lockout, unless it is can be demonstrated that the utilization of a tagout system will provide full employee protection.

3.1.3 Future requirements. Whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

#### **4. Full Employee Protection.**

4.1 Tagout location. When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and The University shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

4.2 Lockout equivalency demonstration. In demonstrating that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout program, The University shall demonstrate full compliance with all tagout-related provisions together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection shall include where possible the implementation of additional safety measures such as the:

4.2.1 Removal of an isolating circuit elements.

4.2.2 Blocking of a controlling switches.

4.2.3 Opening of an extra disconnecting devices.

4.2.4 Removal of a valve handles to reduce the likelihood of inadvertent energization.

**5. Energy Control Procedure Exceptions.** Once a facility evaluation has been accomplished, documented procedures will not be developed when the following conditions exist:

5.1 The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees.

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

5.3 The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment.

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

5.5 A single lockout device will achieve a locked-out condition.

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

5.7 The servicing or maintenance does not create hazards for other employees.

**6. Protective Materials and Hardware.** Appropriate lockout devices such as; locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by The University for isolating, securing or blocking of machines or equipment from energy sources:

6.1 Selection criteria.

6.1.1 Lockout/tagout devices shall be singularly identified; shall be the only devices(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:

6.1.2 Selected lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

6.1.3 Selected tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.

6.1.4 Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

6.1.5 Standardization within the facility. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

6.1.6 Removal requirements.

6.1.6.1 Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

6.1.6.2 Tagout devices. Tagout devices, including and their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

## **7. Initial Training.**

7.1 The University shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

7.1.1 Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.

7.1.2 Each affected employee shall be instructed in the purpose and use of the energy control procedure.

7.1.3 All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

7.2 When tagout systems are used, employees shall also be trained in the following limitations of tags:

7.2.1 Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

7.2.2 When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

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7.2.3 Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

7.2.4 Tags and their means of attachment must be made of materials, which will withstand the environmental conditions encountered in the workplace.

7.2.5 Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

7.2.6 Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

## **8. Refresher Training.**

8.1 Retraining shall be provided for all authorized and affected employees whenever there is a change in their 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.

8.2 Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever The University has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

8.3 The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

8.4 Certification. The University shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

**9. Energy Isolation.** Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.

**10. Notification of Employees.** Affected employees shall be notified of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

**11. Application of Control.** The lockout or tagout procedures shall cover the following elements and actions and shall be done in the following sequence:

11.1 Preparation for shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

11.2 Machine or equipment shutdown. The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

11.3 Machine or equipment isolation. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

11.4 Lockout device application.

11.4.1 Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.

11.4.2 Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.

11.4.3 Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

11.5 Tagout device application.

11.5.1 Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

11.5.2 Where a tag cannot be affixed directly to the energy isolating device, the tag shall 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.

11.6 Stored energy.

11.6.1 Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

11.6.2 If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

11.7 Verification of isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

## **12. Release from Lockout or Tagout.**

12.1 Before lockout or tagout devices are removed. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

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12.1.1 The machine or equipment. The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

12.1.2 Employees. The work area shall be checked to ensure that all employees have been safely positioned or removed.

12.2 After lockout or tagout devices are removed. After lockout or tagout devices are removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.

12.3 Lockout or tagout devices removal. Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. .

### **13. Definitions Applicable to this Instruction.**

**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 out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

**Capable of being locked out** - An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

**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:

1. A manually operated electrical circuit breaker.
2. A disconnect switch.
3. 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.
4. A line valve; a block; and any similar device used to block or isolate energy.
5. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

**Energy source** - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

**Hot tap** - A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

**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 a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

**Normal production operations** - The utilization of a machine or equipment to perform its intended production function.

**Servicing and/or maintenance** - 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.

**Setting up** - Any work performed to prepare a machine or equipment to perform its normal production operation.

**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.

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