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# PURPOSE

To establish a hazardous energy control process consisting of hazardous energy control procedures, employee training, inspections, and other elements that will ensure the isolation of any hazardous energy sources (e.g. electrical, hydraulic, pneumatic, mechanical, ionizing radiation, non-ionizing radiation, chemical, thermal, or other hazardous energy sources). This process shall occur before any service and maintenance is performed on any machine or equipment that could unexpectedly become energized or release stored hazardous energy, its hazardous energy source(s) shall be isolated and made safe.

# SCOPE

The provisions of this standard apply to all TI employees, suppliers, vendors, and visitors at TI sites worldwide.

# reference documents

## TI Standard Policy and Procedure (SP&P) 04-04-01: "Environmental, Health and Safety"

## TI Standard Policy and Procedure (SP&P) 04-07-01: “Record Retention”

# Definitions

[TI ESH Standards Glossary of Definitions](https://sps01.itg.ti.com/sites/wwf/esh/standards/Knowledge_Bank/00.01.xlsx)

# Requirements

## Lock Out Tag Out (LOTO) Procedures

### Each site shall ensure LOTO procedures are developed for each unique piece of machinery or equipment or groups of similar machinery or equipment.

### LOTO procedures shall be available in the work area.

### Sites shall assign, by person or position, responsibility for the creation and update of the LOTO procedures.

### LOTO procedures shall be created by authorized personnel who understand the LOTO program and procedure requirements, understands what the hazards are, how to control the hazard and how to verify isolation of the hazard.

### Machines or equipment with the same or similar type(s) and magnitude(s) of hazardous energy source(s) and which use the same or similar type(s) of controls to control the hazardous energy source(s) can be grouped into one procedure. In order to do this, the machine or equipment covered under the grouped procedure must have the same:

#### Intended use;

#### Procedural steps for shutting down, isolating, and securing the hazardous energy sources;

#### Procedural steps for the placement, removal, and transfer of the lock out or tag out devices; and

#### Requirement for testing a machine or equipment and verifying the effectiveness of lock out tag out devices and other control measures.

### All LOTO procedures shall include the following elements and actions:

#### A statement indicating that the purpose of the LOTO procedure is to prevent injury to an employee from unexpected equipment start-up and stored energy;

#### Identity of the specific machine(s) or equipment to which this procedure applies (i.e., misti id, model type, equipment number, etc.);

#### Who is authorized to perform service and/or maintenance tasks under the procedure (e.g., only authorized personnel), and;

#### Disciplinary actions for failure of employees to comply with the requirements of the LOTO procedure.

#### Provide a list of:

##### The hazardous energy source(s) on the machine(s) or equipment that could cause injury;

##### The magnitude of the hazardous energy (e.g. pressure, temperature, chemical classification, voltage) (or potential risk when the magnitude of the hazard cannot be determined) that could result upon unexpected release from the hazard; and

##### The location(s) at which the LOTO lock(s), LOTO tag(s) and any device (example: clam shell, cord can, etc.) are needed in order to isolate the hazardous source(s).

#### How you will notify affected personnel when the tool/equipment is under LOTO.

#### The service or maintenance tasks that requires LOTO.

##### List each known service or maintenance task that will be performed on the equipment and that requires lock out tag out, and;

##### List the order in which the hazardous energy source(s) must be locked out and tagged out.

#### Verification of energy source(s) isolation.

##### State how to verify that each potential hazardous energy source is properly isolated. Verification must be completed before service or maintenance can begin.

#### Document revision history.

##### State when the procedure was developed, when any changes were made to the procedure, what the changes were and who approved the changes.

#### Temporarily restoring energy

##### When a machine or piece of equipment is under lock out tag out for the purposes of troubleshooting and/or testing it is permitted as long as the following occurs:

###### The machine or equipment is cleared of all tools and materials;

###### Personnel are removed from the machine or equipment area, and;

###### Only the LOTO devices applicable to the troubleshooting and/or testing activities are removed.

1. Following troubleshooting and/or testing, all systems must be deenergized and the LOTO devices reapplied and verified before continuing the service or maintenance activities.

#### Releasing the machinery or equipment from lock out tag out.

##### Before LOTO devices are removed and energy is restored to the machine or equipment for the purpose of putting it back into operation, the following steps shall be taken by the authorized person:

##### The machine or equipment and the work area must be inspected to ensure that non-essential items (e.g., tools, spare parts) have been removed and that all of the machine or equipment components are operationally intact;

##### The work area must be checked to ensure that all personnel have been safely positioned or have cleared the area. In addition, all affected personnel must be notified that the LOTO devices have been removed before the equipment is started, and;

##### Each LOTO device must be removed from the energy-isolating device by the authorized person who applied the LOTO device. If the person is not available to remove his/her LOTO device(s) see section 5.7.5 for additional details

## LOTO Procedure Inspection and Review

### Each LOTO procedure shall be inspected and reviewed every 12 months or sooner if there are modifications to the equipment or LOTO program that might impact the effectiveness of the procedure.

1. For machines or equipment that are not subjected to LOTO over a 12-month period, the procedure should be archived. The next time LOTO is needed, the procedure must be reactivated and the inspection must be performed and documented.

### The inspection process shall ensure that:

#### Each LOTO procedure undergoes an inspection with at least one authorized person utilizing the energy control procedure being inspected. The annual inspection shall be conducted to correct any deviations or inadequacies in the procedure. The authorized inspector will ensure the procedure is followed and that the steps contained in the procedure are correct.

##### The inspector must be an authorized person and cannot be a participant in the service or maintenance activities at the time of the inspection, and;

##### The inspector is not required to observe the authorized person performing every service or maintenance task listed in each procedure; the inspector must only observe the lock out and isolation of the energy sources required by the service or maintenance task being performed at the time of the inspection.

#### The inspection of the LOTO procedures must occur at the machine/equipment while the authorized employee is performing proper isolation.

##### The site shall document the inspector’s name, the person(s) performing the LOTO isolation and each person who participates in the review.

#### The results of the inspection are communicated to each authorized employee who uses the LOTO procedure after each annual inspection is complete. The results of the inspection process shall ensure that:

##### Each authorized employee’s responsibilities, under the procedure are discussed.

### Machines or equipment with the same or similar type(s) and magnitude(s) of hazardous energy and which have the same type(s) or similar control(s) can be grouped for the purpose of inspection. Grouping detailed individual procedures into a single periodic inspection is acceptable if all of the procedures in the grouping have the same or similar:

#### Intended use;

#### Procedural steps for shutting down, isolating, blocking, and securing machines or equipment;

#### Procedural steps for the placement, removal, and transfer of the lock out or tag out devices and the responsibility for them, and;

#### Requirements for testing a machine or equipment to determine and verify the effectiveness of lock out/tag out devices and other control measures.

### A record of the inspector’s name, the name of the person performing the LOTO task and the most recent inspection and review shall be maintained for each LOTO procedure.

Note: In addition to the requirements specified in section 5.2 above, there are additional requirements for US sites. See Appendix A for these additional requirements.

## Training

### Authorized personnel.

#### Authorized personnel shall be trained to:

##### Understand the content and purpose of the LOTO program. and this standard;

##### Recognize sources of hazardous energy and how to identify their magnitude;

##### Identify methods for isolating and controlling hazardous energy;

##### Understand the limitations of tag out (only) when LOTO is not feasible;

##### Determine how to properly install and remove LOTO devices;

##### Verify that LOTO is effective prior to performing any service or maintenance;

##### Understand the content of the procedures referenced in Section 5.1 of this standard;

##### Understand that LOTO devices shall not be used for any purpose other than LOTO;

##### Understand the use of group LOTO, and;

##### Know how to successfully complete LOTO transition during personnel and shift changes.

#### Program retraining shall occur for all authorized personnel at least once every 36 months.

#### When a change is made to the LOTO program that affects the LOTO process, program retraining for authorized personnel shall be completed before the changes to the program become effective.

#### Under the following circumstances, authorized employees shall not be allowed to perform LOTO until they have been retrained:

##### A LOTO procedure inspection reveals that they may have inadequate knowledge of the LOTO program;

##### There is an incident involving lock out tag out on any machine or equipment on which they are authorized to perform service or maintenance on;

##### There is a change to the LOTO procedure; or

##### There is a change to the equipment or machine which introduces new hazards not covered by the current LOTO procedure in use.

### Affected personnel.

#### Affected personnel shall be trained to:

##### Understand the purpose of the LOTO program and the use of LOTO procedures;

##### Understand that LOTO devices shall never be by-passed, ignored, or removed;

##### Understand the limitations of tag out (only);

##### Understand that they shall not attempt to turn on equipment that is locked-out and/or tagged-out, and;

##### Understand the disciplinary actions for failure to comply with this program.

##### Program retraining shall occur at least once every 36 months.

##### Affected personnel shall be retrained within 30 days if, during an inspection, an audit or some other means, it is determined there is inadequate knowledge of the LOTO program.

### Other personnel

#### Understand the purpose of the LOTO program;

#### Understand the limitations of tag out (only), and;

#### Understand the purpose of LOTO locks and LOTO tags.

### A record of training for authorized personnel, affected personnel and other personnel containing a summary of the training’s content, each attendee’s name, and dates of training shall be maintained.

## LOTO Hardware and Application

### The combination of a LOTO lock and a LOTO tag shall be placed on each energy-isolating device to ensure the protection of the authorized person during service and/or maintenance.

### When an energy-isolating device cannot physically be locked out, the requirements of “Tag out (Only)", Section 5.6, of this standard shall apply.

### Each authorized person performing service or maintenance shall place their LOTO lock and LOTO tag on each energy-isolating device or use the group LOTO process identified in Section 5.5.

### LOTO locks and LOTO tags shall not be used for any other purpose.

### LOTO locks and LOTO tags shall be standardized:

#### Only locks that are red in color may be used for performing LOTO, and;

#### All LOTO tags used by any TI employee or supplemental supplier shall use standardized text in the local language as well as English and include the following information:

##### Signal word “Danger”

##### Warn against the hazard “Do Not Operate”

##### Provide a method to identify the owner of the tag (e.g. name or tag owner or name of group LOTO device (TF-Box1-L1, Thinfilm Box 1 Lock 1))

### The authorized person’s contact information shall be available on the LOTO lock or the LOTO tag. The contact information shall include the following:

#### The name or another means to identify the authorized person (example: person responsible for the lock);

#### The authorized person’s phone #, radio #, pager # or some other means to contact the owner of the LOTO lock, and;

#### The date the LOTO device was applied to the energy isolating device.

### LOTO locks shall require a key to open.

### LOTO locks shall not be master keyed (i.e., one key cannot open multiple authorized persons’ LOTO locks).

### Control Locks and tags

#### “Control locks” may be used for isolating an energy source or system, when there is no service or maintenance being performed.

#### “Control locks” shall not be red; they may be any other color.

#### “Control locks” may be a combination lock and may have multiple keys available to open the lock.

#### “Control tags” may be used for isolating an energy source or system, when there is no service or maintenance being performed.

#### “Control tags” shall not use the same signal phrase as used on the LOTO tags.

## Group LOTO Requirements

### The following applies for group lock out:

#### When a multiple LOTO device (e.g., hasp) or similar LOTO hardware is used, each authorized person must place a LOTO lock and LOTO tag on each energy isolating device.

#### When a group LOTO lockbox is used, a group LOTO lock and LOTO tag shall be placed on each energy isolation device.

##### The keys to the group LOTO locks shall be placed inside the group LOTO lockbox.

##### Each authorized person performing service and/or maintenance under the LOTO procedure shall place a LOTO lock and LOTO tag on the group LOTO lockbox.

### When more than one person is involved in lock out tag out, a “group lock out coordinator” shall be designated to coordinate the work. The “group lock out coordinator’s” responsibilities shall include:

#### Ensure each individual has placed his/her LOTO lock and LOTO tag on each energy isolating device or group LOTO device, and;

#### Affix his/her LOTO lock and LOTO tag to the group LOTO device or box.

1. The “group lock out coordinator” shall be the last person to remove his/her LOTO lock from each energy isolating device or group LOTO device.

## Tag Out (Only)

### When it is not feasible to lock out equipment and machinery a tag out (only) procedure shall be developed that details why it is infeasible to place a lock out device and what additional safety measures shall be implemented for tag out (only) Additional safety measures can include but are not limited to:

#### Removal of isolating circuit elements (e.g., fuses);

#### Blocking of controlling switches, and;

#### Removal of a valve handle.

### The tag out (only) procedure shall be approved by the Site ESH Manager before the work is to begin. (Site ESH Manager refers to the ESH Manager responsible for the person(s) who perform service or maintenance on the equipment)

### The site shall retain a copy of the approved procedure for the life of the equipment

## LOTO Lock and/or LOTO Tag Removal

### Upon completing the service or maintenance task(s), the employees must ensure that their LOTO lock(s) and/or LOTO tag(s) are removed.

### Locks, tags, and all other safety warning devices can be left in place during short absences (e.g., taking a break or leaving the work area to pick up parts).

### When work is temporarily suspended (e.g., overnight or over a weekend) LOTO locks and LOTO tags can be left in place as long as the servicing or maintenance will continue upon the authorized employee’s return to the site.

### When work is suspended for an extended period of time (e.g., more than a week), the LOTO device(s) must be removed from the equipment or machinery and replaced with “control lock(s)” or “control tag(s)”. In addition, the equipment or machinery shall have all covers, guards and access panels reinstalled.

### When the authorized employee who applied the LOTO lock and LOTO tag is not available at the site to remove the device, the device may only be removed with approval of the Equipment Engineering Manager or Facilities Manager (or designee) and the site ESH representative.

### Before the LOTO lock and/or the LOTO tag can be removed the following must occur:

#### It must be verified and documented that the authorized employee who applied the device is not at the site at the time the LOTO lock and/or LOTO tag is removed;

#### All reasonable effort to contact the authorized employee must be made before removing the LOTO lock and/or LOTO tag, and;

#### It must be verified that the equipment is safe to restart.

### The authorized employee shall be informed that his/her LOTO lock and/or LOTO tag has been removed before he/she resumes work at the site.

### The process used to verify items in Section 5.7.6 shall be documented once the lock is removed. The documentation shall be maintained for one year and shall include the following (see example in Appendix B):

#### The name of the employee whose lock is being removed;

#### The means used to contact the authorized employee;

#### The date the contact was attempted;

#### The name of the person(s) who authorized the lock removal, and;

#### The date the lock was removed.

## Personnel or Shift Changes

### The following practices shall be utilized during personnel changes to ensure the machine or equipment cannot be unexpectedly energized as the work is transferred between the off-going and oncoming personnel:

#### The authorized person(s) being replaced during his/her shift must ensure that the LOTO lock(s) and LOTO tag(s) of his/her replacement are substituted for his/her own LOTO lock(s) and LOTO tag(s), and;

#### The transfer of LOTO locks and LOTO tags must occur in person (all authorized persons present at the same time).

### The following practices shall be utilized during shift changes to ensure the machine or equipment cannot be unexpectedly energized as the work is transferred between the off-going and oncoming personnel:

#### If a lock out procedure is to continue through the following work shift, the authorized person(s) being replaced after his/her shift is complete must ensure that the LOTO lock(s) and LOTO tag(s) of his/her replacement are substituted for his/her own LOTO lock(s) and LOTO tag(s), and;

#### The transfer of LOTO locks and LOTO tags must occur at the energy isolating device(s).

#### Before any service or maintenance task(s) proceeds following a shift or personnel change, the oncoming employees must re-verify that all energy sources are de-energized and isolated.

## Supplier Coordination

### There shall be coordination and communication between TIers and suppliers when they are working together on activities covered by this TI standard.

### When suppliers are not required to have their own LOTO program, they shall follow the requirements of this standard and may use the site’s LOTO devices.

## LOTO Exemption

### LOTO may not be required if:

#### LOTO and documented energy control procedures are not required for cord and plug connected electrical machinery or equipment when all of the following exist:

##### The machinery or equipment is unplugged and the hazards of unexpected energization or start up of the equipment are controlled by the unplugging of the equipment from the energy source, and;

##### The electrical plug is under the exclusive control of one person performing service or maintenance. Exclusive control refers to instances in which the plug is physically in the possession of the individual, or in arm's reach and in the line of sight of the individual. This exclusive control enables the employee to prevent the equipment from becoming reenergized during servicing or maintenance

##### If one person and one hazard can be controlled by maintaining the hazard in hand, no LOTO or procedure is required. If multiple individuals and/or multiple hazards exist then exclusive control cannot be maintained and LOTO must take place for all hazardous energy sources.

#### Minor changes and adjustments, and other minor service 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 there is an alternative means being used for EFFECTIVE employee protection. Alternative means can include:

##### Hardware-based interlocks;

##### A physical barrier or guard;

##### Light curtain, or;

##### Control switches.

##### The safeguard(s) used must remain under the exclusive control of the employee performing the minor service or maintenance and must not expose an employee to the unexpected energization or activation of the equipment or machine or the release of stored energy.

#### The site must document the controls used to ensure the work is performed safely.

#### Each task must be reviewed and documented one time.

#### The document must include the following:

##### The reason(s) lock out tag out cannot be performed;

##### The procedures which will be used to perform the work, and;

##### The personnel protective equipment required to perform the work, if needed.

### Documented energy control procedures are not required for machinery or equipment 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 the employee;

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

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

#### The machine or equipment is isolated from the energy source and locked out during service or maintenance;

#### A single lock out device will achieve a locked-out condition;

#### The service or maintenance does not create a hazard for other employees, and;

#### The site has had no incidents involving the unexpected activation or re-energization of the machine or equipment during service or maintenance while using this exclusion.

# STANDARD Approval

This standard has been approved by David Thomas, TI Vice President.

# Revision history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rev#** | **Date** | **Nature of Revision** | **Author/Editor** | **Approver** |
| A | 12/29/2005 | Major periodic review; modified annual procedure inspection requirements; moved procedure content requirements out of 3.1; Appendices moved to Knowledge Bank | Greg Durham and James Gordon |  |
| B | 08/25/2008 | Major periodic review; comprehensive reorganization of standard. Name change to “Lock out Tag out”. | Mike Alton |  |
| C | 01/18/2010 | 3.8.a.2 – personnel/shift changes: transfer must occur in person vs. at the energy isolating device. 3.10.a.1 – (a) exclusion language added; (c ) deleted | Mike Alton |  |
| D | 06/08/2012 | Update to requirements within the LOTO procedure. (relocated the requirement for having a purpose statement, identifying the authorized person(s) and disciplinary action statement have been added to the body and are no longer just US requirements. Provided an example LOTO removal document (appendix B) and provided minor updates to text and updated the format. | Rene’ Graves | ELC |
| E | 03/29/2017 | Updated standard based on input from sites and remove section on Robot Teaching (05.10.1.3). | Rene’ Graves | ELC |

United States Specific Requirements

In the US, LOTO programs and procedures must also include the following elements as they relate to each referenced paragraph (numbered below) in the ESH Standard.

**5.2.2** In the US, the procedural requirements specified in section 5.2.2.3 for authorized personnel also apply to affected personnel who use or operate a machine or equipment where tag out (only) is applied (not feasible to lock out the energy source).

**5.3.1.2** In the US, the requirements for retraining authorized personnel on the procedures as specified in section 5.3.1.3 also apply to affected personnel who use or operate a machine or equipment where it is infeasible to lock out an energy source and tag out (only) is applied.

**5.4** In the US, turn-key suppliers LOTO locks shall be standardized by color, shape or size according to the requirements of their own LOTO program.

**5.4.10** In the US, sites shall use tags with the signal phrase “Danger - Do Not Operate”, and have a format similar to the Brady LOTO tag model #76226 or #66052.

**5.4.10** In the US, turn-key suppliers LOTO tags shall be standardized by print and format according to the requirements of their own LOTO program.

**5.9**  In the US, turnkey suppliers shall implement their own LOTO program and provide their own LOTO devices in accordance with OSHA or their respective state agency. In addition, to the requirements as described above in Appendix A, turn-key suppliers are expected to use both a lock and a tag each time lock out tag out is required.

Lock Out Tag Out Lock Removal Document

**This form is to be used when a LOTO (Lock Out-Tag Out) device is removed by someone other than the person who applied the device. Failure to follow and document the appropriate steps to remove a LOTO device can result in disciplinary action up to an including termination.**

Date form filled out: Time form filled out:

Name of LOTO Device owner whose lock is being removed:

LOTO Device Owners phone number:

LOTO Device Owners supervisor:

DOCUMENT ATTEMPTS TO CONTACT LOCK OWNER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | DATE | TIME | METHOD | RESULT |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

Reason for Removing Lock (LOTO device owner sick, forgot to remove, etc.)//Tag

Removal of Lock Out//Tag Out Device and Appropriate Notifications

(Evaluate the entire affected system to ensure employee safety before LOTO device is removed.)

|  |  |
| --- | --- |
| Removed by: | Department: |
| Observed by: | Department: |
| Date: | Time: |

EE or Facilities Managers’ (or designee) Signature

EE or Facilities Managers’ (or designee) Print

ESH Representative Signature

ESH (Print Name)

Notification to Authorized Employee whose lock was removed or the Supervisor of removed Lock out/Tag Out device (prior to beginning their next shift):

|  |  |  |
| --- | --- | --- |
| DATE | TIME | METHOD (i.e. in person, telephone) *e-mails and voicemails are not acceptable methods of notification that LOTO was removed!* |
|  |  |  |