



SECTION 6

ELECTRICAL SAFETY / CONTROL OF HAZARDOUS ENERGY



1. CONTROL OF HAZARDOUS ENERGY POLICY AND PROCEDURES

- A. OSHA References:** 29 CFR 1910.147, 29 CFR 1910.332, 29 CFR 1910.333, 29 CFR 1926.417
- B. Policy:** It is the policy of Maul Electric, Inc to comply with electrical safety / control of hazardous energy standards established by OSHA in 29 CFR 1910.147, 332, and client established policies and procedures for Control of Hazardous Energy. This program shall be inspected annually by the Field Services Manager. A certified review of the inspection including date, equipment, employees & the inspector shall documented and maintained on file. The client policy and procedure will supersede this policy and procedure if it meets or exceeds the OSHA and Maul Electric, Inc requirements.
- 1. Scope:** This procedure is intended to cover necessary safety precautions and procedures for servicing and maintenance of machines and equipment in which the unexpected energization or start-up, or release of stored energy could cause injury to employees. This policy and procedure applies to all Maul Electric, Inc, employees, Maul Electric, Inc Subcontractors and their employees.
 - 2. Purpose:** This procedure covers the minimum requirements for lockout/and or tagout of energy isolating devices to protect employees from hazardous energy including electrical, mechanical, hydraulic, pneumatic, or other stored energy. It will be used as a procedure for isolation of all potentially hazardous energy before employees perform any servicing and maintenance activities where unexpected start up or release of stored energy could cause injury.
 - 3. Training:** Training will be provided to appropriate Maul Electric, Inc employees and subcontractors in accordance with 29 CFR 1910.147, The training must include recognition of hazardous energy source, type & magnitude of energy available, methods & means necessary for energy isolation & control. Each authorized employee shall receive adequate training. The training should address that all affected employees are instructed in the purpose & use of the energy control procedure. There should be training provisions included for any other employee whose work operations are or may be in an area where energy control procedures may be utilized. The employee training should also address when tagout systems are used including the limitations of a tag (tags are warning devices & do not provide physical restraint). The training should also include that a tag is not to be removed without authorization. The tag



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is never to be ignored or defeated in any way. Retraining is required when there is a change in job assignments, in machines, a change in the energy control procedures, or a new hazard is introduced. All training and/or retraining must be documented, signed & certified. The employees will also be trained in the application of this policy or client policy by Maul Electric, Inc or its' clients.

1. Employees who face a risk of electric shock but who are not qualified persons shall be trained & familiar with electrically related safety practices.
2. Employees shall be trained in safety related work practices that pertain to their respective job assignments.
3. Clearance distances (The lines shall be deenergized and grounded or other protective measures shall be provided before work is started)
4. **Exceptions:** This policy does not cover:
 - a) Installations under the exclusive control of electric utilities for the purpose of power generation, transmission, and distribution including related equipment for communication or metering.
 - b) Exposure to electrical hazards from work on or near electrical utilization installations that are covered by 29CFR 1910 Subpart S.
 - c) **FAILURE TO COMPLY:** Failure to comply with this policy and procedure or the client established policy and procedure are grounds for immediate removal and subsequent discharge in accordance with the Maul Electric, Inc Red Flag Violations Policy.
5. **Inspection:** An inspection for compliance with the Maul Electric, Inc policy and procedures for control of hazardous energy will be conducted and documented annually, by a company designated competent person.
6. **Deviations:** the Maul Electric, Inc Safety Director may approve Deviations to this policy and procedures only.
7. **Protective Materials And Devices:**
 - a) Locks, tags, chains, wedges, key blocks, adapter pins, self locking fasteners, or other hardware will be provided by the employer for isolating, securing or blocking of machines or



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- equipment from energy sources. These devices must be singularly identified and used specifically for the purpose of isolating, securing, or blocking from energy sources. They must be durable and capable of withstanding the environment to which they are exposed.
- b) Lockout devices must be substantial enough to prevent removal without the use of excessive force or unusual techniques, i.e. bolt cutters, hack saw, etc.
 - c) Locks will be issued to individual employees. Extra keys will not be available. Keys for individual employee locks will not be given to other employees or supervisors. If a lock does not contain the identity of the installer, a tag must be installed with the lock to provide the identity of the installer.
 - d) Tagout devices must be constructed and printed so that exposure to damp atmospheres, weather conditions, and corrosive atmospheres will not damage the tag.
 - e) Tagout devices must clearly identify the name of the installer and the hazardous condition protected against, i.e. *Do Not Open, Do Not Operate, Do Not Energize, Do Not Start, Do Not Close, etc.*
 - f) Tagout devices must be attached with material that will withstand the weather and atmosphere associated with the location of the tag.
8. **Shift Change Or Relief From Job Assignment:** Employees departing the job site at the end of the working day or having a change in assignment during the working day will remove the locking and tagging device in the following manner:
- a) If relieved by another Maul Electric, Inc employee, the departing employee will accompany the newly assigned employee to the lockout/tagout device(s) and remove their individual lock. The newly assigned employee will verify the effectiveness of the isolation and install their lockout/tagout device.
 - b) If no relief is provided, the employee will contact the Maul Electric, Inc Foreman. The Foreman will accompany the employee to the lockout/tagout device and install their personal lockout/tagout device to the isolation equipment after verifying that effective isolation is maintained. The Maul Electric, Inc Foreman shall remove their lockout/tagout device upon reassignment or resumption of work by another employee. Control Of Hazardous Energy Procedure
9. **General:** This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It must be used to



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ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

10. **Compliance:** All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment that is locked out to perform servicing or maintenance shall not attempt to start, or energize or use that machine or equipment. Under no circumstance shall employees de-energize, lockout, or return to service, machines or pieces of equipment without the express consent of the client designated representative and Maul Electric, Inc Foreman.
11. **Enforcement:** Failure to comply with this procedure will cause immediate removal from the work site and subsequent termination.
12. **Job Planning:** Safe work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized. Maul Electric, Inc Supervisor are expected to include the anticipated need for lockout devices during the pre-job planning walk through. An alternate procedure must be used for machines or equipment that cannot accept a positive locking device. Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely. Protective shields, protective barriers or insulating materials as necessary shall be provided. If employees are subject to handle long dimensional conductor objects (ducts or pipes), steps for safe work practices shall be listed in the job hazard analysis. If portable ladders are to be utilized they may only be constructed of fiberglass.

Conductive items of jewelry or clothing shall not be worn unless they are rendered non-conductive by covering, wrapping or other insulating means.

13. **Lockout/Tagout:** Machines and equipment may be exposed to unexpected release or start up from more than one source. Conductors and parts of electrical equipment that have been deenergized but not been locked or tagged out shall be treated as live parts. A careful check must be accomplished. A job Specific



Lockout/tagout procedure will be completed as part of a Job Task Safety Analysis.

14. **Communication:** The Foreman will advise Maul Electric, Inc employees that a lockout procedure will be required. The specific procedure (locking, tagging, etc.) will be communicated as well as the potential release hazard and magnitude. Unqualified personnel shall maintain a 10 feet approach distance and all unauthorized personnel shall be restricted from the work area. Barricades and signage shall be in place for this purpose. Vehicle and other mechanical equipment shall be restricted from the area until authorized by the Qualified Person. For qualified approach distances see table S5:
15. **Equipment Preparation:**
 - a) **Shutdown of Equipment:** Client owned equipment, Maul Electric, Inc equipment, or subcontractor supplied equipment in use by the client will not be shut down by Maul Electric, Inc employees without the express permission of the client designated representative and the Maul Electric, Inc Foreman. If shutdown is performed by anyone other than the effected worker zero energy must be physically verified prior to the start of work.
 - b) **Shutdown Sequence:**
 - (1) Shutdown the equipment/process by normal procedures.
 - (2) Locate the necessary energy isolating device(s) for the equipment/process and operate them to isolate energy sources and affix lockout/tagout devices.
16. **Preparation:**
 - a) Relieve all stored or residual energy and take appropriate measures to ensure energy does not re-accumulate and affix a lockout/tagout device as necessary.
 - b) Ensure that other employees are not exposed and verify that energy isolation and release of stored energy have been accomplished.
 - (1) Check bleeders for pressure or flow or material.
 - (2) Operate push or start buttons. After pushing start buttons, push stop button.
 - c) If the machine or equipment is effectively locked out, maintenance or servicing may begin.
 - d) 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 to be controlled, and the methods or means to control the energy.

17. Return To Service:

- a) Maul Electric, Inc employees will not return client equipment, Maul Electric, Inc or subcontractor equipment in use by the client to service without the express approval of the client designated representative and the Maul Electric, Inc Foreman.
 - (1) Replace all guards' safety devices; remove all personnel, tools, and equipment. Remove all personally installed lockout and tagout devices.
 - (2) Notify the client-designated representative and Maul Electric, Inc Foreman that servicing or maintenance has been completed.

18. Lockout/Tagout Device Removal By Employer: Removal of lockout/tagout devices by someone other than the installer will be accomplished under the following conditions:

- a) The Foreman must establish, by contacting the employee, that all servicing and maintenance has been completed.
- b) The Foreman must confirm that all bleeders, blocks, and switches are closed or in the off position.
- c) The Foreman must insure that all guards and safety devices are removed and all personnel, tools, and equipment are removed from the area.
- d) The Foreman may remove the lockout/tagout device.
- e) The Foreman must notify the client-designated representative that servicing and maintenance has been completed.
- f) The Foreman must investigate and document the removal and the cause for removal.

19. Group Lockout Procedures: If more than one person is involved in the lockout of equipment, the following procedure will apply:

- a) If an energy lockout device is not capable of accepting multiple locks or tags, a multiple lock out, or tagout device will be used.
- b) If a lockout device is to be used, a single lock may be used to lockout the machine or equipment. The key must be placed



- in a lockout box or cabinet that allows the use of multiple locks to secure it. Each employee will lock the box or cabinet with their individual lock and remove it as their work is ended.
- c) When lockout/tagout devices must be temporarily be remove to test equipment the following must be completed, documented, and verified by the foreman:
- (1) Clear away all tools
 - (2) Remove employees
 - (3) Remove LOTO device
 - (4) Energize and test
 - (5) De-energize and reapply LOTOI devices
20. **Authorized Employee:** The authorized employee should ascertain the exposure status of individual group members. Each employee shall attach a personal lockout or tagout device to the group's device while he/she is working & then removes it when finished. The authorized employee will shall designate someone on the next shift to be in charge of the lockout and shall be entrusted with a key. Documentation of the people in charge shall be kept



2. REQUIREMENTS FOR ELECTRICAL LOCKOUT / TAG-OUT

- A. OSHA References:** 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1926.417
- B. Electrical Lockout/Tagout:** Live parts to which an employee may be exposed must be de-energized before the employee works on or near them, unless an additional hazard may be created, or it is not feasible due to equipment design or operational limits. Live parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or explosion due to electric arcs. While any employee is exposed to contact with parts of fixed electric equipment, or circuits, which have been de-energized, the circuits energizing the parts shall be locked out or tagged out or both in the following order.
- a) Safe procedures for energizing circuits and equipment shall be followed.
 - b) The circuits and equipment to be worked on shall be disconnected from all electric energy sources.
 - c) Control circuit devices such as push buttons, selector switches and inter-locks will not be used as the sole means for de energizing equipment.
 - d) Interlocks will not be used as a substitute for lockout and tagging.
 - e) Stored electric energy must be released. Capacitors must be discharged and high capacitance elements must be short-circuited and grounded, if the stored electric energy might endanger personnel.
 - f) Stored non-electrical energy devices that could re-energize electric circuit parts shall be blocked or relieved to prevent accidental energizing of the circuit by the device.
- C. Procedure:** A lock containing employee working on the equipments name and contact information and tag must be placed on each disconnecting means used to de-energize circuits and equipment on which work is to be performed.
1. The lock must be installed to prevent persons from operating the disconnecting means unless they resort to undue force or the use of tools.
 - a) Each tag must contain a statement prohibiting the authorized operation of the disconnecting means and the removal of the tag.



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- b) If a lock cannot be applied or the tagging procedure will provide a level of safety equivalent to the use of a lock, a tag may be used without a lock.
- c) A tag used without a lock must be supplemented by at least one additional safety measure that provides a level of safety equal to the use of a lock.
 - (1) Removal of an isolating circuit element,
 - (2) Blocking of a controlling switch
 - (3) Opening of an extra disconnecting device.
 - (4) A lock may be placed without a tag if:
 - (a) Only one circuit or piece of equipment is de-energized and,
 - (b) The lockout period does not extend beyond one work shift and.
 - (c) Employees exposed to the hazard associated with re-energizing the circuit or equipment are familiar with this procedure
 - (d) It must be verified by a qualified person that the circuit has been de-energized in the following manner:
 - (i) A qualified person must operate the equipment operating controls or otherwise verify that the equipment cannot be restarted.
 - (ii) A qualified person must use test equipment to test the circuit elements and electrical parts of the equipment and verify that the circuit elements and equipment parts are de-energized.
 - (iii) Tests must also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back-feed even though specific parts of the circuit have been de energized and presumed to be safe.
 - (iv) If the circuit to be tested is over 600 volts, nominal, the test equipment must be checked for proper operation prior to and immediately after testing.
 - (5) Prior to re-energizing equipment, the following requirements must be met, even if the circuit or equipment is to be temporarily energized.
 - (a) A qualified person must conduct tests and visual inspections to verify that all tools,



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- electrical jumpers, shorts, grounds and other devices have been removed.
- (b) Employees exposed to the potential hazards from re energizing the circuit or equipment must be warned to stay clear of the circuits and equipment.
- (c) The employee who installed it must remove each lock and tag. If the employee who installed the tag or lock is absent, the lock may be removed by a qualified person designated by the foreman provided
 - (i) The Foreman ensures that the employee who installed the lock or tag is not available at the site.
 - (ii) The Foreman ensures that the employee who installed the lock or tag is made aware that the lock or tag has been removed before that individual resumes work at the work place.
- (d) A visual determination must be made that all employees, tools, electrical jumpers, shorts, grounds, and other devices have been removed.
- (e) The only electrical circuits and electrically powered equipment which do not have to be locked and tagged are:
 - (i) Lighting circuits for the purpose of re-lamping, unless the removal of a broken lamp base is required.
 - (ii) Circuits of less than 50 Volts.
 - (iii) Circuits that must remain energized to accomplish the task, i.e. electrical troubleshooting.
 - (iv) Electrically driven hand tools, office equipment, and portable electrical equipment supplied power by cord and plug do not require lock out if the plug is disconnected and in full view of the employee servicing the equipment



Only qualified persons may work on electric circuit parts or equipment that have not been deenergized. Such persons shall be made familiar with the use of special precautionary techniques, PPE, insulating & shielding materials and insulated tools and minimum approach distances (see table):

TABLE S-5 - APPROACH DISTANCES FOR QUALIFIED
EMPLOYEES - ALTERNATING CURRENT

Voltage range (phase to phase)	Minimum approach distance
300V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in. (30.5 cm).
Over 750V, not over 2kV	1 ft. 6 in. (46 cm).
Over 2kV, not over 15kV	2 ft. 0 in. (61 cm).
Over 15kV, not over 37kV	3 ft. 0 in. (91 cm).
Over 37kV, not over 87.5kV	3 ft. 6 in. (107 cm).
Over 87.5kV, not over 121kV	4 ft. 0 in. (122 cm).
Over 121kV, not over 140kV	4 ft. 6 in. (137 cm).