michigan municipal league

Liability & Property Pool
Workers' Compensation Fund

RISK CONTROL SOLUTIONS

A Service of the Michigan Municipal League Liability and Property Pool and
the Michigan Municipal League Workers' Compensation Fund

LOCKOUT/TAGOUT FOR HAZARDOUS ENERGY

INTRODUCTION

Locking out machinery and equipment before service or maintenance is essential to protecting employees from unexpected energizing, motion, start-up, or release of stored energy. Electrical, hydraulic, pneumatic, chemical, kinetic (motion), or other powered equipment that starts up unexpectedly during maintenance or repairs can result in employee injury or death. These risks to employees are severe enough that lockout/ tagout is the fourth most frequently cited OSHA violation nationally.

This document identifies hazardous energy sources, associated hazards, and procedures for controlling hazardous energy in compliance with:

- MIOSHA's General Industry Safety Standard Part 85. The Control of Hazardous Energy Sources Standard;
- MIOSHA Part 40. Electrical Safety-Related Work Practices;
- Federal OSHA's 1910.147 Control of Hazardous Energy (Lockout/Tagout Energy Procedures); and
- OSHA 1910.333 Selection and Use of Work Practices.

These standards apply to employers, employees, and contractors.

DEFINITIONS

The following definitions are found in MIOSHA General Industry Standard Part 85, Section 1910.147(b).

(The paragraphs in italics below each definition are comments from MML Loss Control.)

Affected Employee – An employee whose job requires them to operate or use equipment on which servicing or maintenance is being performed under lockout or tagout or whose job requires them to work in an area where such servicing or maintenance is being performed.

Affected Employees need to know when work that may affect them will be performed on their equipment or in their work area.

Authorized Employee – An employee trained in identifying and isolating hazardous energy sources. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

> *An Affected Employee becomes an Authorized Employee when the employee's duties include servicing or maintenance using Lockout/Tagout methods and receiving appropriate training to isolate the hazardous energy, repair the equipment, and return the equipment to service.*

Lockout – The placement of a lockout device on an energy isolating device, per an established procedure, ensures that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

> *The isolation of energy from a machine, equipment, or process by physically locking the operating system in a safe mode. Lockout devices hold energy-isolation devices in a safe or "off" position. They protect by preventing machines or equipment from becoming energized. They are positive restraints that no one can remove without a key or other unlocking mechanism or through extraordinary means, such as bolt cutters.*

Tagout – The placement of a tagout device on an energy isolating device, per an established procedure, indicates that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

> *Tagout devices are prominent warning devices that an Authorized Employee fastens to energy-isolating devices to warn employees not to reenergize the machine while they service or maintain it. Tagout devices are easier to remove and provide employees with less protection than lockout devices. Tags are warning devices and do not provide the physical restraint of a lock.*

HAZARDOUS ENERGY

A wide variety of powered equipment uses electricity – wired, battery, or capacitors. Equipment may also use various pressurized fluids (hydraulic, water, other), pressurized air (pneumatic), steam, mechanical (compressed or stretched springs), gravitational energy (suspended or supported loads), chemical, rotational, and other forms of power to operate the equipment. There may also be stored or residual energy remaining once the primary energy source is shut down. All forms of energy can injure or kill if released unexpectedly when someone is in the way of the power or the equipment it operates.

Failure to recognize energy potential and de-energize when preparing to service or repair equipment can result in unexpected energy discharges, electrocution, electrical scalding, chemical burns, crushing, laceration, amputation, and other injuries. The stored energy can be by design, like using capacitors or flywheels, or by malfunction, such as a jammed conveyor belt or failure of a heavy equipment support mechanism. The effect is the same if the accumulated energy is released unexpectedly.

Typical tasks requiring lockout/tagout procedures include:

- A task requiring an employee to place any body part into an area on a machine's point of operation or where an associated danger zone exists during a machine's operating cycle.
- Cleaning, repairing, and maintaining machinery with moving parts.
- Clearing jammed mechanisms.
- Removing or bypassing a guard or other safety device.
- Repairing electrical circuits.

No detailed state or national data is available on the number of workers killed each year by contact with uncontrolled hazardous energy. However, associated injuries can include:

- Caught In/Between/On,
- Contact with Hot Objects/Steam/Hot Fluids,
- Contact with Sharp Objects,
- Foreign Object in Eye,
- Struck by Object, and
- Striking Against Object, among others.

Injuries associated with hazardous energy include amputation, asphyxiation, avulsion, burns, crushing, electric shock, and scalding.

HAZARD CONTROL

What Employers Should Do

Employers are responsible, under federal and state rules, to:

- Develop a written lockout/tagout program with energy control procedures and employee training. The document should discuss the program's scope, purpose, authorization, rules, techniques, and enforcement. Failure to have a documented lockout/tagout program is the most frequent citation under Lockout/Tagout violations. Useful resources include:
    - MIOSHA has the rules and other resources online at: https://www.michigan.gov/leo/bureaus-agencies/MIOSHA/Resources/pub-pos-form-media/Publications-by-Topic/general-industry-safety-publications#loto
    - Guides and video resources are available through the Safetysurance website at: https://www.safetysurance.com/gateway
    - Your MML Loss Control Consultant – simply email or call.

- Identify hazardous energy sources. A key component is identifying all hazardous energy sources and marking all energy isolation points. Examples of energy sources include:
    - Electrical – motors, lights, computers, heaters, batteries, electrical panels.
    - Hydraulic – trash compactors, bailers, lifts, elevators, forklifts.
    - Pneumatic – air compressors, lifts, pneumatic hand tools, shop air.
    - Water/hot water/steam – domestic water, chilled water, return water, water towers, boilers, steam lines, hot water heating, and power-cleaning equipment.
    - Potential – gravity/spring energy – rolling doors, dump trucks, forklifts, lift equipment, water towers.
    - Thermal – welding, torch work, chemical reactions, heat exchangers, boilers.
    - Kinetic/motion – flywheels, rotating shafts, power take-offs.
    - Chemical – decomposition mixing.
- Identify and provide the appropriate means of isolating energy sources and buy adequate locking devices and tags for each type of energy source at each location. Use effective tagout methods when lockout is not possible. Tagout should provide at least as much protection for employees as a lockout. Failure to apply the energy-control devices is the fifth most frequently cited Lockout/Tagout violation.
- Designate Authorized Employees who are “authorized” and trained to perform lockout/tagout.
- Provide *adequate* training for Authorized and affected Employees and document all training. Create and post written and visual, equipment-specific lockout procedures. Failure to provide training as described by OSHA is the fourth most frequently cited Lockout/Tagout violation.
- Monitor the program for effectiveness. Conduct periodic inspections and communicate results to employees. Review the program at least annually. *Failure to conduct regular inspections as described by OSHA is the second most frequently cited Lockout/Tagout violation.*
- Provide additional training based on the monitored effectiveness and employee feedback.
- Identify and notify Affected Employees before and after each lockout/tagout.

When specific MIOSHA standards contain a lockout requirement, for example, Part 17 Refuse Packers or Part 72 Automotive Service Operations, this requirement must be followed as it preempts the tagout option in Part 85. Although a specific standard need for lockout is observed in these cases, the procedural and training requirements of Part 85 will also continue to apply. The result is a complete program for protecting employees from energy hazards.

LOCKOUT PROCEDURES

Employers must select Authorized Employees and only allow Authorized Employees to perform lockout/tagout procedures.

Authorized Employees should:

- Establish a safe and orderly procedure before de-energizing circuits or equipment.
- Disconnect circuits and equipment requiring service from all electric energy sources. They must not use control circuit devices, such as push buttons, selector switches, and interlocks, as the sole means for de-energizing circuits or equipment. Interlocks are not acceptable substitutes for lockout.
- Release stored energy that might endanger employees. If stored in electric energy, discharge capacitors, short circuits, and ground high-capacitance elements might endanger personnel like solar power systems. Treat the capacitors and associated equipment as energized if employees must handle them to meet this requirement. Release pneumatic or hydraulic pressure and disconnect or block lines. Lower or block-supported or suspended weight/counterweights, such as gravity batteries or vehicles on hoists. Release or block springs or other equipment under tension, like jammed overhead doors or conveyors.
- Place a lock on each disconnecting means to de-energize circuits and equipment on which employees will work. The Authorized Employee should attach the lock so that another employee cannot operate the disconnecting means without exerting undue force or using tools to remove the lock.

OSHA and MIOSHA standards only consider circuits or equipment de-energized once employers meet the above requirements. Only then can Authorized Employees work on the equipment.

Authorized Employees should:

- Test controls for operating equipment or otherwise determine that the equipment will not restart.
- Use test equipment on the circuit elements and electrical parts of equipment that employees may be exposed to verify that they are de-energized. The test should also determine if any energized condition exists due to inadvertently induced voltage or unrelated voltage back-feed, even though specific circuit parts have been de-energized and are presumed safe. If the circuit that requires testing is more than 600 volts, nominal, the Authorized Employee should check that the test equipment is operating correctly immediately before and immediately after the test.

REMOVING LOCKS / TAGS

As with implementing lockout/tagout, only Authorized Employees may remove energy controls. They should meet all the following requirements, in the order listed, before re-energizing circuits or equipment, even temporarily:

Authorized Employees should, in the order listed:

1) Conduct tests and visual inspections, as necessary, to check that employees have removed all tools, electrical jumpers, shorts, grounds, and similar devices so that the circuits and equipment can be safely energized.

2) Warn Affected Employees exposed to the hazards associated with re-energizing the circuit or equipment to stay clear of circuits and equipment.

3) Verify that equipment controls are in a neutral position.

4) Supervise the removal of energy controls. The Authorized Employee who applied each lock should remove it or direct an employee under their direct supervision to remove it. If the Authorized Employee who used the lock is absent from the workplace, another Authorized Employee may remove it if they comply with both of the following provisions:

   - The employer verifies that the Authorized Employee who applied the lock is unavailable.

   - The employer makes sure that the Authorized Employee who applied the lock knows – before they resume work – that another Authorized Employee has removed it.

5) Determine by visual inspection that all employees are clear of the circuits and equipment.

OTHER REQUIREMENTS

If using a lock is not practicable, or if the employer can demonstrate that tagging procedures will provide safety equivalent to a lock, a tag may be used without a lock. The tag should comply with all the following requirements. The tag should:

- Be of a distinctive employer design, clearly legible and understandable by all Affected and Authorized Employees or any other persons in the area, durable to withstand conditions in the area used, securely attached not to detach unintentionally, clearly prohibit unauthorized energizing of circuits, and removal of the tag.

- Not be used without an additional safety measure, such as removing an isolating circuit element, blocking a controlling switch, or opening an extra disconnecting device.

- Meet the requirements of general industry safety standard Part 37. Accident Prevention Signs and Tags.

The employer should also effectively train all persons with access to a controlling device to be familiar with the employer's tagging procedures. *All training must be documented.*

Under the law, employers must comply with each of the above requirements. More importantly, compliance will help employers ensure that employees will be safe and rigorous when using lockout/tagout procedures.

Contact MML Risk Management Services Staff
or your Loss Control Consultant for more information.

Important Phone Numbers

MML Risk Management Services	734.662.3246 or 800.653.2483
Loss Control Services	800.482.0626
MIOSHA Consultation, Education & Training	517.284.7720

Note:
This document is not intended to be legal advice.
It only identifies some of the issues surrounding this topic.
Public agencies are encouraged to review their procedures with an expert or a competent attorney who is knowledgeable about the subject.

ADDITIONAL RESOURCES

SAFETYSURANCE

https://www.safetysurance.com

SafetySurance is a virtual library of accident prevention and safety-related information. Access to SafetySurance and its safety resources and training videos is free for all MML Liability & Property Pool and Workers' Compensation Fund members.

MIOSHA GENERAL INDUSTRY STANDARDS:

Part 85. The Control of Hazardous Energy Sources Standard:
BSR-STD- (michigan.gov)

Part 40. Electrical Safety-Related Work Practices:
BSR-STD- (michigan.gov)

Part 37. Accident Prevention Signs and Tags:
Compared With OSHA (michigan.gov)

MIOSHA Lockout/Tagout Compliance Guide:
https://www.michigan.gov/documents/leo/leo_miosha_cetsp27_731247_7.pdf

MIOSHA Fact Sheet - Machine Specific Lockout:
Fact_G009.pdf (michigan.gov)

FEDERAL OSHA STANDARDS:

1910.147 Control of Hazardous Energy (Lockout/Tagout Energy Procedures):
https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.147

1910.333 Selection and Use of Work Practices:
https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.333

SELF-ASSESSMENT: LOCKOUT/TAGOUT FOR HAZARDOUS ENERGY

Many serious injuries – even deaths – occur each year due to employees working on or performing maintenance on equipment. Because of the grave risk to employees who work on or near machinery and other devices with stored energy, employers should take a proactive approach to Lockout-Tagout safety. To determine if your practices concerning the control of energy sources are adequate, review the best practices listed below and identify and correct any deficiencies in your practices as soon as possible.

Organization Name **Completed by** **Date**

Does Your Organization:

(A response of "No" may require further analysis and/or an action plan for correction.)

Yes	No		Lockout/Tagout
☐	☐	**1.**	Have a written Lockout/Tagout policy?
☐	☐	**2.**	Is your Lockout/Tagout policy accessible for inspection and reference?
		3.	Does your Lockout/Tagout out policy:
☐	☐		Identify locations of equipment with hazardous / stored energy?
☐	☐		Identify energy control procedures?
☐	☐		Discuss the scope, rules, authorization, and enforcement of the policy?
☐	☐		Identify training requirements for employees?
☐	☐		Require training of both affected and authorized employees?
☐	☐		Apply to contractors as well as employees?
☐	☐		Require documentation of trainings and employee attendance?
		4.	Does your Lockout/Tagout training program include:
☐	☐		The purpose of the program?
☐	☐		Methods to control typical energy sources?
☐	☐		The responsibilities of authorized and affected employees?
☐	☐		Refresher trainings when conditions change?
☐	☐	**5.**	Do you designate authorized employees who may perform Lockout/Tagout?
		6.	Do your locks and tags meet the following requirements:
☐	☐		Do you have adequate locks and tags available?
☐	☐		Do they fit the energy source?
☐	☐		Are they NOT centrally keyed or duplicated?
☐	☐		Are they controlled to ensure that extra keys are not available?
☐	☐		Do the tags provide at least as much protection as the locks?

Yes	No		Lockout/Tagout
		7.	Do you enforce and monitor use of the Lockout/Tagout policy? Do you:
☐	☐		Conduct periodic checks of work areas?
☐	☐		Discipline employees who violate the policy?
☐	☐		Review program effectiveness at least annually?

CONCLUSIONS

If you can honestly answer "yes" to all applicable questions, your Lockout/Tagout program for controlling hazardous energy is on solid footing – congratulations! Following the recommended practices reduces your organization's exposure to future claims in this area. Remain vigilant for new or changing risks and address them promptly.

If you answered "no" to one or more questions, your organization faces increased exposure to employee injuries and workers' compensation claims and the associated direct and indirect costs. Each "no" response indicates a possible deficiency in your risk management program. You should consider these carefully and take one or more of the actions below:

- Correct any deficiency that may exist;
- Contact your attorney for advice;
- Contact MML Risk Management Services at the numbers below;
- Contact MML Loss Control Services at the number below.

Contact MML Risk Management Services Staff
or your Loss Control Consultant for more information.

Important Phone Numbers

MML Risk Management Services	734.662.3246 or 800.653.2483
Loss Control Services	800.482.0626
MIOSHA Consultation, Education & Training	517.284.7720

Note:
This document is not intended to be legal advice.
It only identifies some of the issues surrounding this topic.
Public agencies are encouraged to review their procedures with an expert or a competent attorney who is knowledgeable about the subject.