

The Past, Present, and Future of Lockout/Tagout

WHERE WE CAME FROM, AND WHERE WE ARE GOING



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OSHA's standard for the Control of Hazardous Energy (Lockout/Tagout) 29 CFR 1910.147 addresses one of the most critical safety procedures in general industry – protecting workers during servicing and maintenance of machines and equipment from unexpected startup or release of stored energy.

Craft workers, electricians, machine operators, and laborers are among the three million workers who service and maintain equipment routinely and face the greatest risk of injury from energy sources including electrical, mechanical, hydraulic, pneumatic, chemical, thermal, and other sources in machines and equipment. Employees in almost every industrial division are exposed to such hazards, but most lockout/tagout accidents and injuries occur in manufacturing.

Serious injuries and fatalities

OSHA believes that failing to control energy adequately accounts for nearly ten percent of the serious accidents in many industries. Not having firm control of hazardous energy while servicing and maintaining equipment results in some of the most gruesome serious injuries and fatalities in workplaces:

- An employee removing paper from a waste hogger climbed onto the machine, fell onto the conveyor (which had not been shut down), was pulled into the hogger opening, and was fatally crushed.
- An employee was partially inside an asphalt mixing machine, changing its paddles. Another employee dusting in the control room accidentally hit a toggle switch, which caused the door of the mixer to close, striking the employee inside in the head and killing him.
- A worker was cleaning scrap from beneath a large shear when a coworker hit the control button activating the blade. The blade slashed down and decapitated the employee cleaning scrap.





The brutality of these tragedies, pulled from OSHA enforcement cases, is reinforced by data collected by the U.S. Bureau of Labor Statistics (BLS). Analysis of BLS lost-workday data indicates that the severity of injuries from failing to control hazardous energy sources (an average of 24 lost workdays per incident) is much higher than the national industry-wide average of 16 lost workdays per incident.

In fact, OSHA has estimated that its lockout/tagout (LOTO) standard prevents 85 percent of the total number of injuries or fatalities from exposure to hazardous energy in the workplace. It estimated that approximately 31,900 minor (non-lost-workday) injuries, 28,400 lost-workday injuries, and 122 fatalities per year are prevented by the standard.

Years of standard-setting

OSHA's LOTO standard was a long time in coming. When OSHA first published general industry standards in 1971 (adopting either national consensus standards or existing federal standards), there was no general, all-encompassing consensus or federal standard for locking out, tagging out, or disabling machinery or equipment to protect workers when maintenance or servicing duties were performed. OSHA did, though, adopt lockout-related provisions of consensus standards developed for specific types of equipment, such as powered industrial trucks, overhead cranes, derricks, woodworking machinery, mechanical power presses, forging machines, welding, bakery equipment, sawmills, and electrical safety-related work practices.

Since the inception of the OSHA enforcement program in 1971, the agency for the most part had to rely on use of the "General Duty Clause" (section 5[a][1] of the Occupational Safety and Health Act) citation to ensure that employers protected their workers. OSHA conceded that this approach met with only limited success because compliance officers had to prove that the hazard was a "recognized" hazard and that it was causing or could cause death or serious physical harm.

Filling a significant gap

Due to enforcement shortcomings, and the need to fill a significant gap in the adopted general industry standards of 1971, OSHA began in 1977 to gather information to write a comprehensive standard for energy control in general industry. Collecting data on accidents resulting from failing to use effective lockout or tagout protocols was difficult because many accidents were not reported, or reported and categorized in other causal factor categories, such as "caught in" or "caught between," according to OSHA. Many lockout-related injuries and fatalities were also incorrectly classified using more-common categories, such as burns, electrocutions, lack of machine guarding, or equipment failure.

In January, 1977, OSHA published a Notice in the Federal Register, "Machinery and Machine Guarding, Request for Information on Technical Issues and Notice of Public Meetings." OSHA asked if lockout should always be required when machinery is not in its normal operating mode, or whether alternative methods, such as tagout, should be permitted. Respondents to the Notice generally recognized the hazards to employees when maintenance and repair work was being done, and the need to lockout or tagout to control these dangers. Opinions varied widely, though, on whether a lock, tag, or combination of these devices provided the best protection.

In May, 1979, the United Auto Workers (UAW) petitioned OSHA to issue an Emergency Temporary Standard (ETS) for locking out machinery and equipment, submitting case studies of fatalities involving 22 members attributed to lockout-related causes since 1974. In September 1979, OSHA declined to issue an ETS, but said it was drafting an Advance Notice of Proposed Rulemaking (ANPR) to address the issue.

The ANPR for a standard on lockout/tagout was published in the Federal Register in June 1980. Several other developments helped the standard-setting process. NIOSH published "Guidelines for Controlling Hazardous Energy during Maintenance and Servicing" in 1980. And in March, 1982, the American National Standards Institute (ANSI) published a national consensus standard for lockout/tagout, ANSI Z244.1-1982, "American National Standard for Personnel Protection – Lockout/Tagout of Energy Sources – Minimum Safety Requirements." OSHA used the ANSI standard as the primary basis for developing its proposed rule.




In July 1983, OSHA drafted its first proposal of a LOTO standard and circulated it for feedback to associations, companies, and unions. Most sources supported it. Some favored the use of locks rather than tags to secure energy isolating devices; others wanted the flexibility of using either. Some objected to defining lockout of activities as “normal production operations.”

In April 1988, OSHA’s official proposal for a LOTO standard was published in the Federal Register. Two public hearings were conducted later in 1988, and an extended public comment period ran from April 1988 to May 1989. The most contested issues: 1) Is lockout/tagout required for normal production operations (which would involve more downtime); and 2) Should locks or tags be the primary means to prevent operation of energy isolating devices such as electrical disconnects, and hydraulic or pneumatic valves?

Finally, a standard

In September, 1989, OSHA issued the final rule for lockout/tagout – more than 12 years after it began developing requirements. The standard stated that servicing and maintenance activities, and also erection, installation, construction, setup, changeover, and dismantling, must be performed with the equipment de-energized. The standard would also cover lubricating, cleaning, unjamming, and making other minor adjustments and simple tool changes that often take place during normal production operation, but may expose employees to unexpected activation of the equipment or the unexpected release of energy. All of these activities OSHA considered to be servicing and maintenance, and came under the scope of the standard.



29 CFR § 1910.147... The Control of Hazardous Energy (Lockout/Tagout) ...requires the employers to 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.

Regarding servicing and/or maintenance during normal production operations, OSHA stated that if a worker was protected by machine guards that could not be removed or bypassed, the lockout/tagout standard would not apply. But if an employee might need to bypass or remove the guard and reach into the point of operation, and if this kind of servicing could expose the employee to unexpected activation or the release of stored energy, the lockout/tagout standard *would* apply.

OSHA provided this exception: the LOTO standard does not apply when certain minor servicing tasks are conducted during normal production operations, such as: 1) *repetitive* adjustments; 2) tool changes, lubrication, leak inspections, and other *routine* activities; 3) activities that are *integral* to the production process; and 4) work is performed using *alternative protective measures* that provide effective employee protection. If an employer can demonstrate that an alternative means enables the servicing employee to clean or unjam or in other ways service the machine without being exposed to unexpected energization or activation of the equipment, the LOTO standard does not apply.

In the final rule, OSHA determined that lockout, not tagout, is the preferred method of assuring de-energization of equipment. But the agency stated that tagout will need to be used instead of lockout

where the energy control device cannot accept a locking device. When an energy control device is lockable, the standard requires that lockout be used unless tagout can be shown to provide “full employee protection” equal to lockout. After January 2, 1990, new machines, and modified or repaired older machines, had to be designed to accept lockable energy isolating devices.

OSHA’s definition of 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.”

OSHA’s definition of 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.”

More than locks and tags

OSHA states that its standard is not simply focused on the use of lockout versus tagout; rather, the use of locks and/or tags is part of an OSHA-mandated comprehensive energy control program. These programs consist of the following OSHA requirements, provisions of the LOTO standard:



- **Writing specific procedures** for each piece of equipment that identify all energy sources and energy isolation devices. The procedure becomes a checklist to assure that all energy sources are controlled before servicing and maintenance starts. Specific procedural steps must be detailed for: 1) shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy; 2) the placement, removal, and transfer of lockout or tagout devices and the responsibility for them; and 3) for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

- **Training employees**

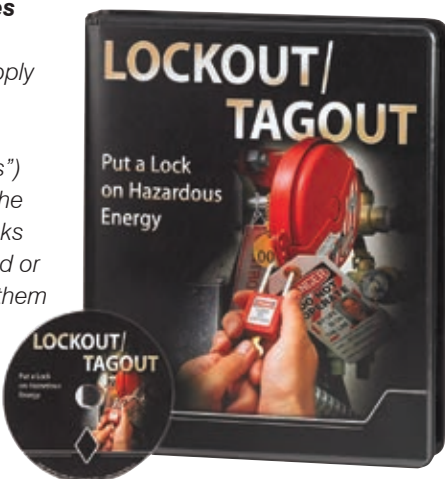
(called “authorized employees”) who apply locks and tags, and employees (called “affected employees”) who either operate the machines where locks and tags are installed or whose jobs require them to work in an area where servicing or maintenance is being done.

Retraining is required when jobs, machinery, or energy control procedures change, or inspection reveals program inadequacies.

- **Conducting audits** at least every year of each procedure and reviewing audit findings with each authorized employee where lockout is used, and each authorized and affected employee where only tagout is used.

OSHA also has stated that *discipline* is the most critical factor to the success of a tagout program, though OSHA does not regulate discipline in any of its standards. Discipline is key according to OSHA because tagging out does not involve positive restraints on energy control devices; it requires constant vigilance to assure tags are properly applied; tags must remain affixed throughout servicing and maintenance of equipment; and no employee can violate the tag by reenergizing the equipment, intentionally or unintentionally, before the tag is removed. Companies with effective tagout programs apply disciplinary action to both supervisors and employees who violate tagout procedures, according to OSHA.

According to comments received by OSHA, in some companies tagout is only used in situations “where the work is relatively low hazard and the person is in control of the energy source.” One commenter said, “The key to safety is not in a specific device, be



it tag or lock. [Safety] rather, lies in good procedures and careful training combined with assurance of accountability. If these three principles are in place, a system which uses tags only will adequately protect employees.”

Industries not covered

The LOTO standard does not cover construction; maritime; agriculture; installations under the exclusive control of electric utilities for the purposes of power generation, transmission and distribution; and oil and gas well drilling and servicing.

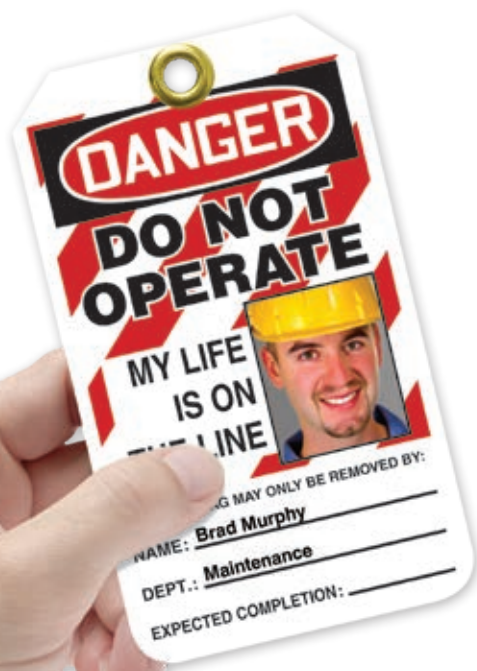
OSHA states that adequate training would be difficult for transient, short-term workers often employed in longshoring, construction, and agriculture. Also, energy control procedures might vary widely from one worksite to the next, and a construction worker could be employed at several sites in a single year. And maintenance work on construction earthmoving equipment such as mobile cranes, front-end loaders, bulldozers, and dump trucks requires the potentially hazardous positioning of buckets, blades, and vehicle body parts – safety issues that are beyond the scope of general industry energy control.

Future lockout/tagout advances

Lockout/tagout procedures have now entered the digital age. High-resolution digital images of lockout/tagout warnings, definitions, and procedures can be displayed near energy source isolation positions and added to digital content libraries. Digital images and templates can also be personalized.

By loading a tablet device with all of a company’s lockout/tagout procedures, employees can take a tablet to a machine, follow the procedure, and safely lockout a piece of equipment. By syncing the tablet to the employer’s shared drive, employees always will be using the most up-to-date copy of the lockout/tagout procedure. Software programs now allow employers to track lockout/tagout use in real time. Managers can monitor which employees are performing the lockout, what machines are being serviced, how long they are being worked on, and how much downtime occurs each month.

Look for employees to use their smartphones to connect to the company database, select a procedure, and show others they are working on the equipment with just a few clicks. Barcodes or QR codes can be affixed to machines, making it easy for employees to scan and produce the needed procedures. And look for preventive maintenance orders to be emailed or texted to the proper maintenance personnel, with a direct link to the machine needing service. Corporate safety personnel will monitor lockout/tagout work on sites around the world. On-site visits will occur less frequently as procedures become available online and webcams capture employees engaged in servicing and maintaining machines and equipment. Technology will enable corporations to standardize lockout/tagout programs with real-time verification and documentation.



Accuform is prepared to help with your Lockout/Tagout needs. For more information, visit www.Accuform.com or call 1-800-237-1001.

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