

Workers performing maintenance on machinery and equipment may be exposed to injuries from unexpected energization, startup or release of stored energy in the equipment they are servicing.

The Occupational Safety and Health Administration (OSHA) lockout/tagout standard requires employers to adopt and implement practices and procedures to shut down equipment, isolate it from its energy source(s) and prevent the release of potentially hazardous energy while maintenance and servicing activities are being performed. While many employers have implemented a lockout/tagout program in their facilities, an often-overlooked portion of this program is the development of specific lockout/tagout procedures for each individual piece of machinery and equipment in the facility. The goal of this document is to assist employers in developing and implementing machine-specific procedures using a three-step process.

Step 1: Collect Information

To develop machine-specific procedures, the first step is to collect information about the piece of equipment you are assessing. Visit the location of the machine and document the following:

- **Name of machine or equipment**—This might be the name assigned by the manufacturer or simply what the machine is referred to within your operations.
- **Physical location of the equipment**—If your company has just one location, documenting the physical location is not an issue. However, if a certain piece of equipment is present in multiple facilities, it is a good idea to document the facility to which the procedure applies.
- **Energy sources present in the machine**—Most equipment is powered by some type of electrical energy, but the energy sources don't end there. You must also consider energy sources such as pneumatic, hydraulic, mechanical, water/gas/steam under pressure, gravitational, thermal



(heat), chemical and other types of energy. Each energy source should be documented.

- **Magnitude of each energy source**—If your equipment is powered by 480-volt electrical service and 100 psi air pressure, document each of these magnitudes. Repeat for each energy source.
- **Method for machine shut-down/stopping procedure**—If the normal stopping procedure is to turn the switch to the “off” position, document this in your notes.
- **Method for releasing any stored energy present**—For instance, if your equipment contains air under pressure, document the method used to dissipate this energy prior to working on the machine. Before any work begins, a “zero energy state” should be achieved. This means controlling not only energy from outside the machine, but also energy that is stored inside the machine.

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- Method used to isolate each energy source—**
 If your equipment is electrically hard-wired, the method to isolate this energy source may be to move the disconnect switch to the “off” position and apply a lock to prevent it from being moved back to the “on” position. For a machine with pneumatic energy, the process may involve closing a valve on the air line and applying a guard over the valve to prevent it from being re-opened.
- Method used to verify that the lockout was successful—**
 As we know, the purpose of lockout is to ensure that the machine cannot be started while being serviced. After lockout has been applied, but before work actually begins, a test should be completed to make sure that the lockout was successful. This may be as simple as pressing the “start” button on the machine. Document each final test that should be performed, making sure to indicate that the machine should be returned to the “off” position once the test is complete.
- Enhance your procedures with photos—**
 Since most lockout procedures are developed in word processing applications, it is often beneficial to take photos of the equipment and energy isolation points (e.g., breaker boxes or gate valves on air lines) and include these in your written procedures. This will make your procedures easier to follow, especially if you have a multilingual workforce.

Step 2: Assemble the Information Into a Written Procedure

After collecting the necessary information in step one, the next step is to assemble the information in a written procedure that can be used by employees performing lockout. Although it is not required to develop written procedures in a word processing program, this is the recommended approach, and allows you to insert photos into the procedure and update it quickly and easily when needed. The following example shows one way to complete a written procedure:

XYZ Manufacturing Co. Lockout Procedure	Equipment: Iron Worker—Main Plant
Approved By: Jim Smith, Safety Officer	Revision Date: 6/1/2010
	
<p>Procedure for Controlling Hazardous Energy</p> <ol style="list-style-type: none"> Be familiar with the sources of hazardous energy for the machine or equipment that will be serviced. <ol style="list-style-type: none"> Electrical: 460 Volts Notify foreman and other affected employees that may also work on the machine that the machine is about to be shut down and locked out. Shut down the machine using the normal stopping procedure: press the “stop” button. Isolate all energy sources listed above. <ol style="list-style-type: none"> Electrical: Turn red switch 90 degrees counterclockwise to the “off” position. Apply lock to switch. Verify that the machine is locked out by pressing the “start” button. No power should be present. The machine is now locked out and work may begin. <p>Procedure for Placing Machine Back in Service</p> <ol style="list-style-type: none"> Check the machine to make sure it is operationally intact, tools have been removed and guards have been replaced. Check to be sure that all employees are safely positioned. Notify all other affected employees that the machine is ready for operations. Restore energy to the machine by removing the lock and turning the switch 90 degrees clockwise to the “on” position. 	

Step 3: Post the Procedure

Once you have completed the written procedure, it is recommended to keep it posted at the machine. Many organizations also keep a second copy of each procedure in a binder in the facility office. It is essential that employees have access to the lockout procedures when they need to perform a lockout.

For Additional Information

EMC Insurance Companies: www.emcins.com

- Online Training—Lockout/Tagout
- Tech Sheet—Lockout/Tagout

Occupational Safety & Health Administration:

www.osha.gov