

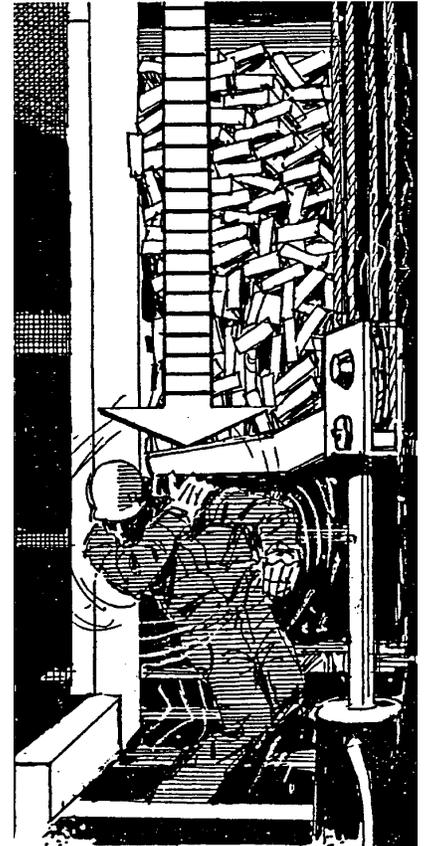
Should *you* be concerned about hazardous energy?

You can't hear it and you can't see it. Hazardous energy is silent and invisible. And if you service equipment that could start or move unexpectedly – or if you work near the equipment when it's being serviced – hazardous energy may be closer than you think. You should be concerned about hazardous energy. You should understand and know how to control it.

Energy is the power for doing work and it's present in many different forms. For example, tensioned objects such as a compressed spring or a suspended load have *potential* energy. Release the tension, and you convert the potential energy to *kinetic* energy: The spring uncoils and the suspended load drops. **Energy becomes hazardous when it's uncontrolled and released in a way that could harm a worker.** (One example is shown in the illustration at right; another example is described below.) Other forms of hazardous energy include flammable, chemical, electrical, and thermal energy.

Hazardous energy in the workplace

Hazardous energy is never far from those who service or repair powered equipment — particularly those who simply turn the power off or shut down the equipment without considering other energy sources that could cause the equipment to start or move unexpectedly. All it takes for an accident is one person who assumes that the equipment is safe without considering other hazardous-energy forms.



How hazardous energy causes accidents: An example.

The accident

An excavation machine operator was inspecting the machine's raised hydraulic erector arm when an unsuspecting coworker pressed a switch that activated the hydraulic arm. The arm crushed the operator against the side of the machine.

The hazardous energy source

Stored (potential) energy in the raised hydraulic arm; releasing the energy caused the arm to drop.

How it could have been prevented

The operator should have secured the raised hydraulic arm so that it would not drop *and* ensured that no one would activate the arm.

How to control hazardous energy

To control hazardous energy, you have to prevent it from being transmitted from its source to the equipment that it powers. You can accomplish that by doing the following:

- Identifying the hazardous-energy source
- De-energizing the equipment by isolating or blocking the energy source
- Eliminating any potential energy that could affect the equipment
- Locking out the equipment

Identifying hazardous-energy sources

Identify equipment in your workplace that needs periodic service or maintenance. Determine the forms of energy that power the equipment, including potential energy that may remain when the energy source is disconnected. Label energy sources to help workers know what equipment is powered by each energy source.

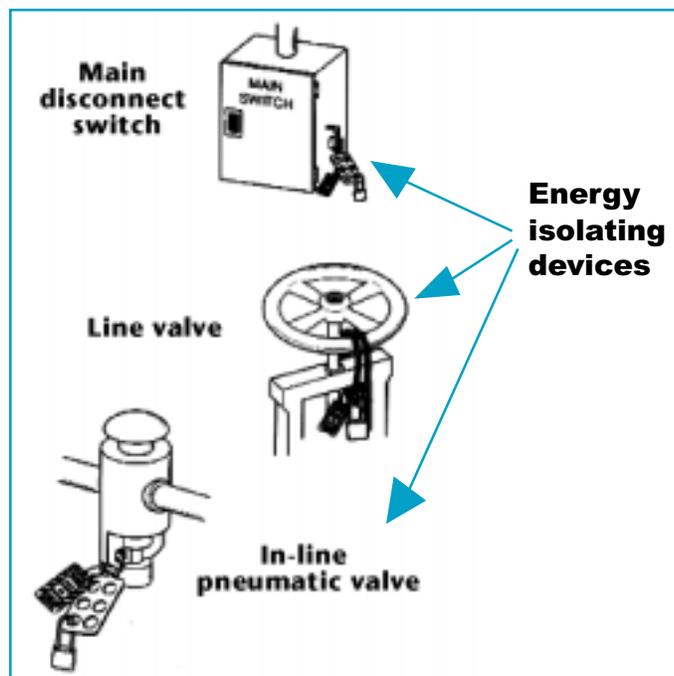
De-energizing equipment

De-energizing equipment means isolating it from its energy source and controlling potential energy so that no energy can flow to the equipment. The method you use to de-energize equipment depends on the form of energy and the means available to control it. Common methods include the following:

- Disconnecting motors from the equipment
- Isolating electrical circuits by disconnecting the power source from the circuits
- Blocking fluid flow in hydraulic, pneumatic, or steam systems with control valves or by capping or blanking the lines
- Blocking equipment parts that could be moved by gravity

Eliminating potential energy

Potential energy must be controlled after equipment has been de-energized. Capacitors, coiled springs, elevated machine members, rotating flywheels, and air, gas, steam, chemical, and water systems are sources of hazardous potential energy. If the energy could return to a hazardous



level, make sure that it remains isolated from the equipment until all service work is finished.

- Vent pressurized fluids until internal pressure levels reach atmospheric levels.
- Discharge capacitors by grounding them.
- Release or block tensioned springs.
- Ensure that all moving parts have stopped completely.

Locking out the equipment

To ensure that no one will unintentionally release hazardous energy that could cause equipment to start or move, you must lock out the equipment's *energy-isolating device*. Examples (shown above) include manually operated electrical circuit breakers, main disconnect switches, and line valves and blocks. A *lockout device*, usually a lock with a unique key or combination, secures the energy-isolating device in a safe position; the equipment it controls will not work until the lockout device is removed.

Where to learn more about controlling hazardous energy

We've given you a brief overview of hazardous energy and summarized how to control it, but we encourage you to learn more.

OR-OSHA's guide to controlling hazardous energy (available April 1, 2002) explains what you need to know and do if you have employees who could be exposed to hazardous energy. The publication will be available on our Web site, www.orosha.org, or you may request one from our Resource Center, (503) 947-7443.