

LOCKOUT TAGOUT

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What is Lockout Tagout?

- Procedure for safe shut down and restart of equipment that is serviced or manufactured
- Lockout protects employees who service and maintain equipment
- Tagout warns employees of the shut down

Who Needs LOTO Training?

- Authorized employees- people who lock or tag out machines or equipment to perform servicing
- Affected employees- people who use the machines or equipment being serviced
- Other employees- people who work in the area of the machines being serviced

Authorized Employees

- Maintain or service equipment
- Identify all energy sources
- Inform others of LOTO in progress
- Follow the LOTO procedures

Affected Employees

- Operate or use equipment
- Understand all LOTO procedures
- Never remove locks or tags
- Never restart equipment

Other Employees

- Are not authorized or affected employees
- Must be able to identify the locks and tags
- Must be aware of LOTO procedures
- Never restart equipment with a lock or tag

Energy Control Program

1910.147(c)(1) Energy control program. The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

OSHA Definition of Service/Maintenance

- **Servicing and/or maintenance.** Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the **unexpected** energization or startup of the equipment or release of hazardous energy.

LOTO Does NOT Apply To:

- **1910.147(a)(2)(iii)(A)** Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.



Lockout/Tagout Prevents

- Equipment from unexpectedly starting-up
- Co-workers from restarting equipment
- Injury and death

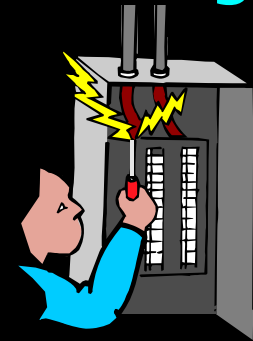
Leading Causes of LOTO Injuries

- Failure to shut of equipment
- Failure to disconnect from power source
- Unexpected restarting of equipment
- Failure to clear work area before restarting

What is Hazardous Energy?

Hazardous energy is one of the following:

Electricity – live or stored



Moving machinery parts



Stored mechanical movement in machinery



What is Hazardous Energy?

Stored heat (steam lines or hot liquids)

Chemicals in pipelines under pressure or force of gravity

Any other active or stored energy sources that could harm a worker



Hazardous Energy Source Examples

Live electrical lines

Electrical capacitors

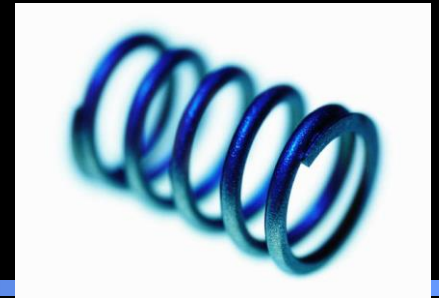
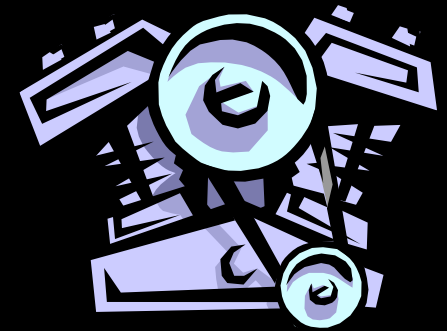
Lasers

Engines that move machinery parts

Hydraulic lifts

Pneumatic (air pressure) lines

Springs



What kind of injuries can happen?

Electrocution from live parts

Scalding from steam or hot liquids

Chemical burns or poisoning

From machinery:

- Deep cuts and gashes
- Crushing injuries
- Amputations

All of these can be fatal when severe



Fatality Example

A man working inside a supermarket cardboard compactor was crushed when the unblocked compactor suddenly came down on top of him.

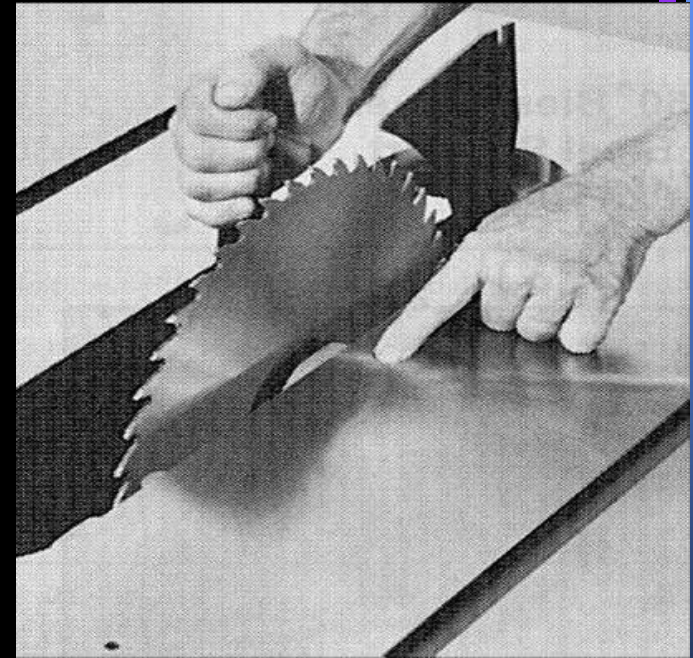


When is Lockout/Tag-out required?

When someone will be servicing or repairing machinery or equipment

AND

the unexpected machinery start-up or release of stored energy could cause injury



Service and Maintenance Examples

Installing, constructing,
adjusting, modifying,
unjamming, cleaning,
lubrication, inspecting,
setup - preparing for normal
function



These activities often require a worker to place all or part of their body into the machine's hazard zone.

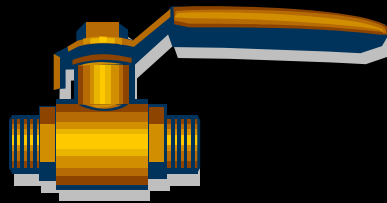
What is an energy-isolating device?

A device that physically prevents transmission or release of energy such as:

An electrical circuit breaker,



A pipeline valve,



A machine block,



Anything else that positively blocks or isolates energy.

Energy Isolating Device/Tagout

- **1910.147(c)(3)(i)** When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

What is a Lockout Device?

A device that positively:

prevents a machine from being started up or turned on,

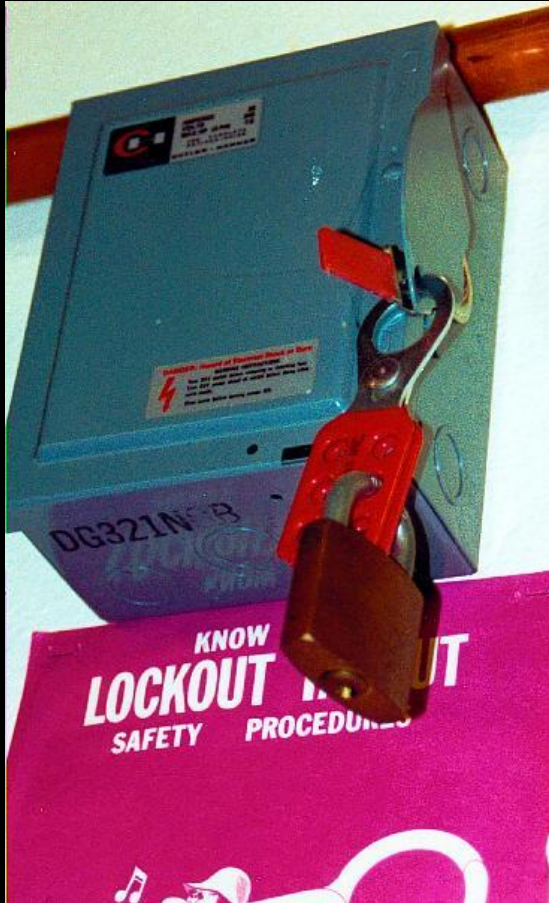
prevents a machinery part from moving,

prevents electrical energizing,

blocks a pipeline, steam line or air line



Electrical Lockout Devices



Locked out electrical panel

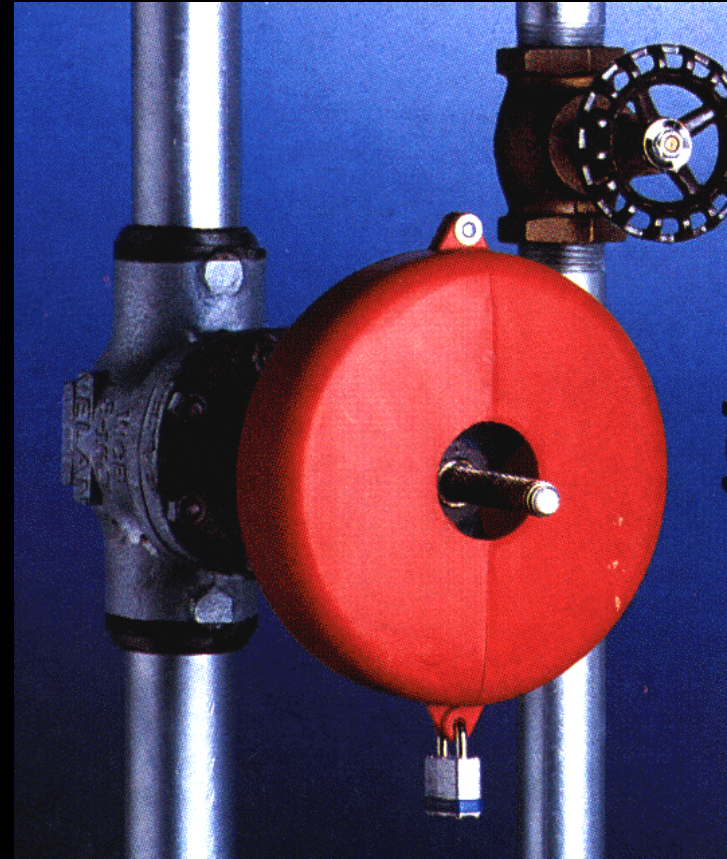
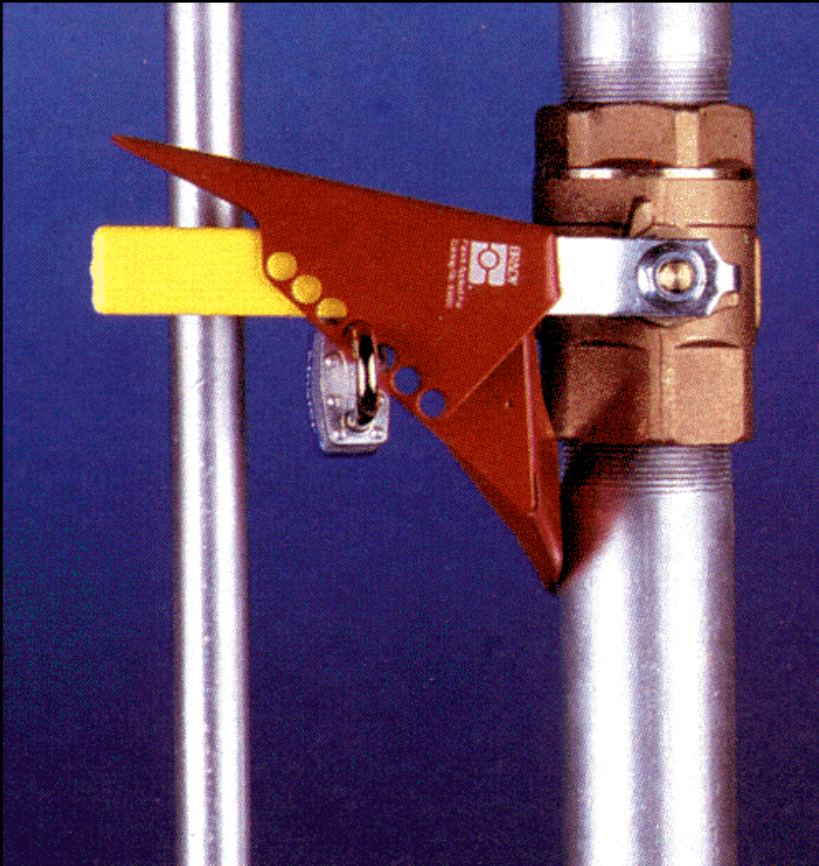


Locked out circuit breaker

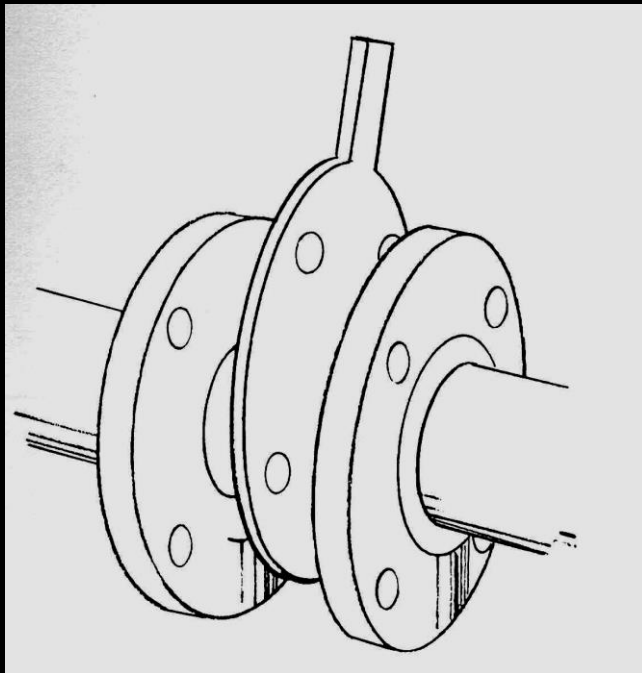


Locked out electrical plug

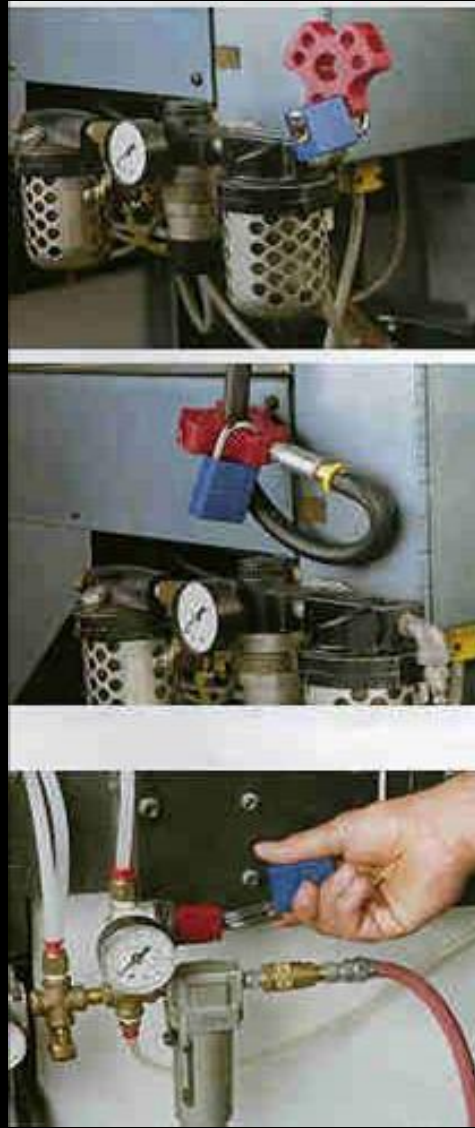
Fluid & Gas Lockout Devices



Pipe Lockout Examples



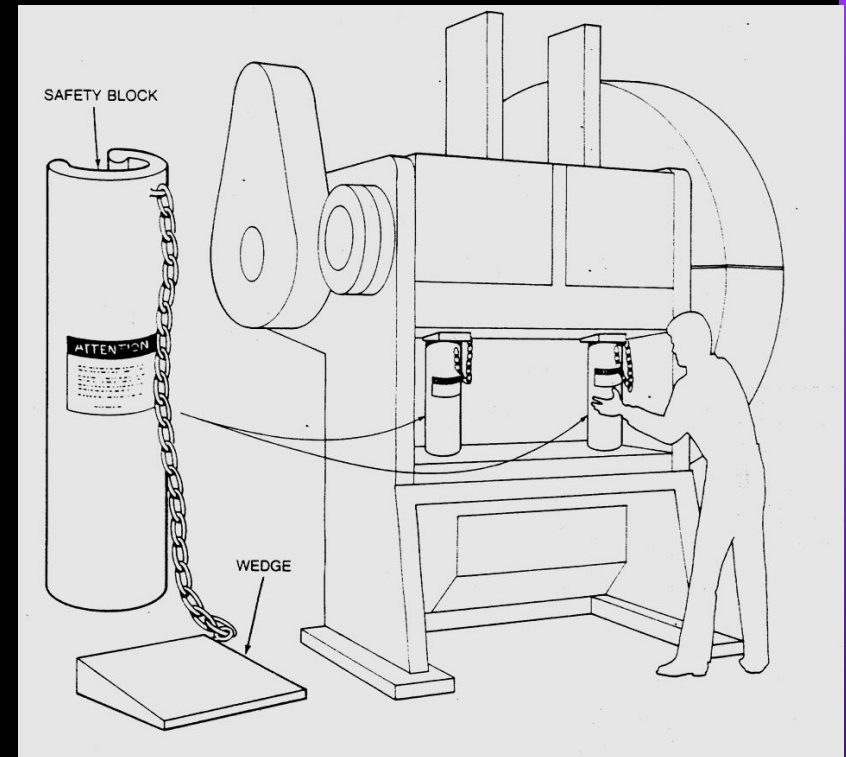
Pneumatic Lockout Examples



Physical Blocks



Truck bed lockout



Punch press blocks

Group Lockout Devices

Used when more than one person doing maintenance or repair on same machine or equipment.

Machinery or equipment can't be started up until all locks are removed.

Each person places and removes their own lock.



Example of a bad lockout/tagout



What is Tag-out?

Tags are warning devices only

They don't provide the same level of protection as lockout devices.

They can only be removed by an authorized person.

They must be legible, securely attached and resistant to degradation.



Locks and Tags Must:

- **1910.147(c)(5)(ii)(A)(1)** Lockout and Tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
- **1910.147(c)(5)(ii)(A)(2)** Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
- **1910.147(c)(5)(ii)(A)(3)** Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.
- **1910.147(c)(5)(ii)(B)** Standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

Locks and Tags Must:

- **1910.147(c)(5)(ii)(C)(1) Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.**
- **1910.147(c)(5)(ii)(C)(2) Tagout devices. Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.**

Lockout Procedures

Six Steps to Follow:

1. Notify affected employees that machine or equipment will be shut down and locked out
2. Shut down the machinery or equipment
3. Isolate energy sources with energy-isolating devices

Lockout Procedures

Six Steps

4. Lock out energy-isolating devices with assigned locks.
5. Release or restrain stored or residual energy
6. Test machinery to make sure it can't start up

Lockout Steps

**Notify
employees**

**Shutdown
Equipment**

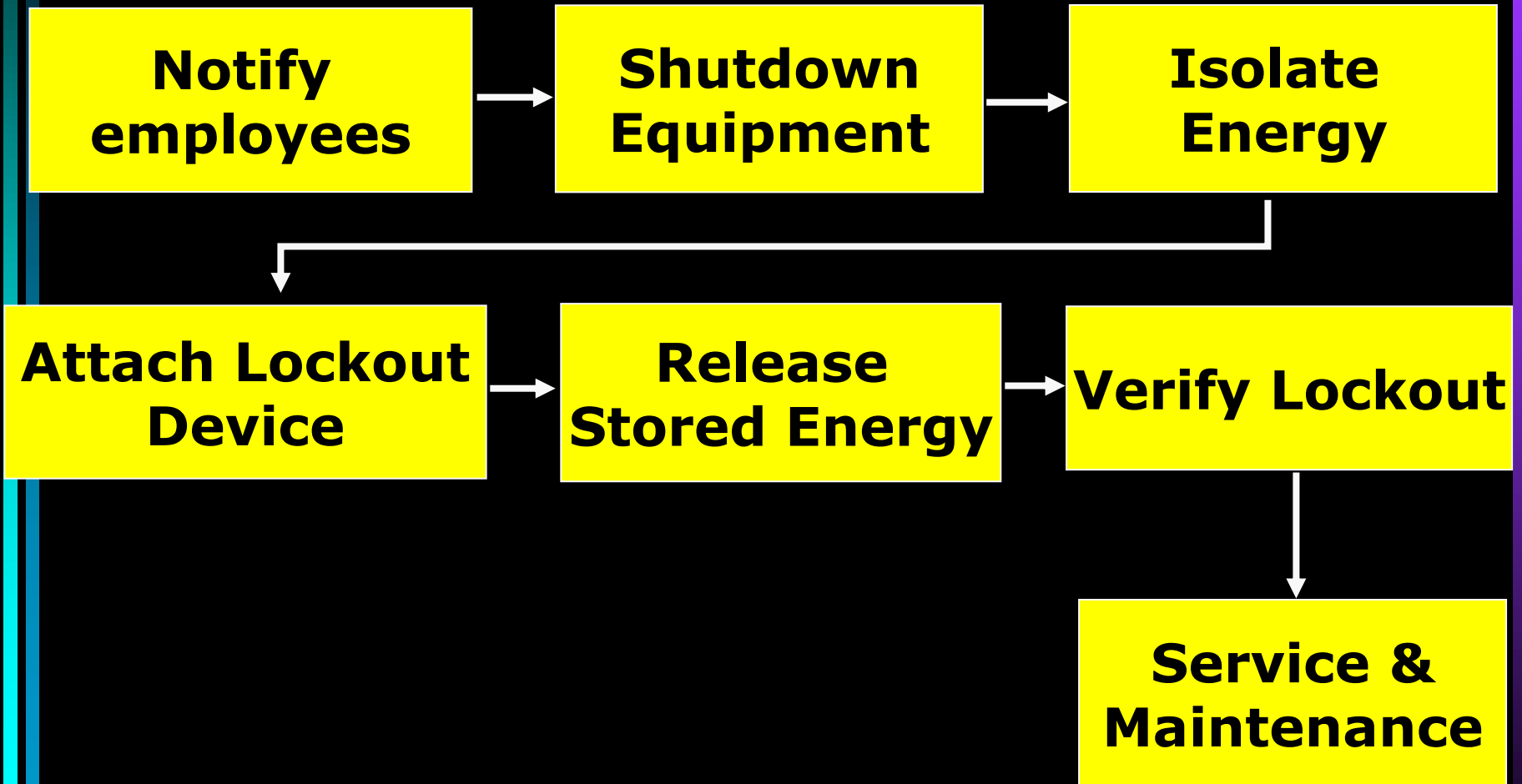
**Isolate
Energy**

**Attach Lockout
Device**

**Release
Stored Energy**

Verify Lockout

**Service &
Maintenance**



Examples of Release of Stored Energy

- “Slowly open the receiver tank port and bleed off any internal pressure.”
- “Loosen both line valves to relieve all pressure in the cooling circuit.”
- “Ground out capacitor...”

Examples of Attempt to Operate

- "...adjust the temperature cycle thermostat to check that all electrical energies have been shut off."
- "Push the start function button to verify that electric power has been removed."
- "Crack the steam inlet and discharge line outlet valves..."

Start-up Procedures

Only authorized employees can do startup

All warned to stay clear

Remove all tools, locks and tags

Remove, reverse, open or reactivate isolating devices

Visual check that all is clear

Start up machine, process or line flow

Your Energy Sources



What are your energy sources?

How do you prevent accidental start up or a release of stored energy?