

# Blog Series: Isolation of Hazardous Energy (Lockout/Tagout) - Part 2

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Blog Series: Isolation of Hazardous Energy (Lockout/Tagout)

## Part 2: A Practical Step-by-Step Lockout/Tagout Process (From Shutdown to Verification)

A good LOTO process is consistent, visible, and verifiable. The exact steps and devices depend on the equipment, but the flow below captures the essentials you want every authorized employee to execute the same way—every time.



### Step 1: Prepare and plan the shutdown

- **Define the work:** What servicing/maintenance will occur? What parts of the machine will be accessed?
- **Identify all energy sources:** electrical, hydraulic, pneumatic, mechanical, thermal, chemical, gravity, and stored energy.
- **Locate isolation points:** disconnects, breakers, valves, blank flanges, blocks, pins, chains, bleed points, etc.
- **Check for special conditions:** multiple feeds, backup generators/UPS, stored pressure, elevated components, remote controls, automation sequences.
- **Notify affected employees:** communicate equipment status, expected downtime, and boundaries.

## Step 2: Shut down the equipment using normal controls

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Use the normal stopping sequence (stop button, HMI stop command, normal valve closure sequence, etc.) before isolating energy. This reduces unexpected movement and helps the equipment reach a stable condition.

## Step 3: Isolate the energy sources (not just the controls)

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“Off” is not the same as “isolated.” Isolation means physically preventing energy from reaching the equipment.

- **Electrical:** open disconnects/breakers, rack out where applicable, or otherwise isolate per procedure.
- **Fluid power:** close valves, apply blinds/blocks, isolate pumps/compressors, and use required line breaks only when authorized.
- **Mechanical/gravity:** block, pin, chain, or otherwise secure moving parts and raised loads.

## Step 4: Apply lockout/tagout devices

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- Use a **personal lock** for each authorized worker, unless your process uses a group lock box with equivalent protection.
- **Tag for identification and warning** (who applied it, date/time, contact information, reason), but remember: a tag is not a physical restraint.
- **For group LOTO:** use a lock box or multi-hasp arrangement so each person controls their own exposure.
- **For shift changes:** use a documented continuity process so protection is never reduced during handoff.

## Step 5: Release, restrain, or otherwise control stored energy

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This is where many lockouts fail. Even with isolation points secured, the machine may still have energy in the system.

- Bleed down air lines and verify pressure is at zero.
- Discharge capacitors and confirm with appropriate test methods.

- Block or pin components that could fall or move due to gravity.
- Relieve hydraulic pressure and secure actuators against drift.
- Allow hot surfaces to cool (or protect against burns) if cooling is part of the safe state.

## Step 6: Verify isolation (try/test)

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Verification is the proof step. Use the method that matches the energy type and equipment design:

- **Try:** attempt to start the machine using normal controls to confirm it will not operate (then return controls to the safe/off position).
- **Test:** use appropriate instruments (for example, testing for absence of voltage) when required by the hazard.
- **Observe:** check gauges/indicators and physically confirm valves are in the required position.

**Rule of thumb:** If you can't explain how you know the equipment is at "zero energy," you're not done yet.

## Step 7: Perform the work—maintain control

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- **Maintain boundaries:** keep guards, covers, and access points controlled as planned.
- **Manage scope changes:** if the job expands to new parts of the system, pause and update the isolation plan/procedure.
- **Temporary energization/testing:** if equipment must be energized for testing, follow a controlled "remove locks, test, reapply locks" sequence with clear communication and everyone in a safe position.

## Step 8: Return to service (remove devices in a controlled way)

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- **Inspect the area:** confirm tools are removed, guards are reinstalled, and components are intact.
- **Account for people:** confirm everyone is clear before re-energizing.
- **Remove lockout/tagout devices:** typically by the person who applied them, per your program rules.
- **Notify affected employees:** communicate that equipment is going back into service.

## Takeaway

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Consistency is the point: plan it, isolate it, lock it, control stored energy, and verify it—every time. In the final post, we'll cover the required annual review/periodic inspection and the documentation (“certification”) that proves your program is working and your procedures are accurate.

**Cal/OSHA reference:** Title 8, CCR §3314 includes requirements for energy control procedures and their use (including shutdown, isolation, lockout/tagout application, stored energy control, and verification) before servicing or maintenance is performed.

Tags: Ben IV Lavery (<https://www.cstcsafety.com/blog/category/ben-iv-lavery>), Did you know? (<https://www.cstcsafety.com/blog/category/did-you-know>), Lockout Tagout (<https://www.cstcsafety.com/blog/category/lockout-tagout>)

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