Collaborative Bachelor's Degree Program of Fire Protection and Safety Engineering Technology between Southwest Jiaotong University and Oklahoma State University, U.S.A.

FPST 2023 Industrial and Occupational Safety

Control of Hazardous Energy
(lockout/tagout)
29 CFR 1910.147

1

Injury Prevention

- When people are working around moving equipment, they are protected by one of two methods
  - Machine Safeguarding
    - 29 CFR 1910 Subpart O
  - Controlling Hazardous Energy
    - 29 CFR 1910.147 Control of Hazardous Energy (lockout/tagout)

2

Definitions

- Lockout – The placement of a lockout device on an energy-isolating device to maintain a piece of equipment at zero energy state
- Tagout – The placement of a tagout device on an energy-isolating device to indicate a piece of equipment is at a zero energy state

3

Is this tagout?

4

Is this tagout?

5

Collaborative Bachelor's Degree Program of Fire Protection and Safety Engineering Technology between Southwest Jiaotong University and Oklahoma State University, U.S.A.

1910.147 The control of hazardous energy (lockout/tagout)

His/her

6

Lockout vs. Tagout

- 1910.147(c)(2)(ii)
  - If an energy isolating device is capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize lockout, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection as set forth in paragraph (c)(3) of this section
- 1910.147(c)(3)
  - Full employee protection. (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.
- 1910.147(d)(4(iii)(A)(A)
  - Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

7

Definitions

- Energy Isolating Device – A mechanical device that prevents the release of transmission of energy. Examples are: a manually operated circuit breaker, a disconnect switch, a line valve, a block, and other similar devices.

8

Definitions

- Servicing and/or Maintenance – Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining or servicing machines or equipment. These activities include lubrication, cleaning, or un-jamming machines or equipment and making adjustment or tool changes when the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

9

The OSHA Standard

OSHA requires the following:

- All power sources must be locked out for servicing or maintenance that is not part of normal production operations;
- Guards or interlock devices, used to protect operators during normal operations cannot be substituted for locks during service or maintenance;

10

The OSHA Standard

- The employer must develop a written energy control program that clearly explains procedures for each piece of equipment with one or more energy sources.
- Employees affected by lockout procedures must be trained.

11

Energy Sources

- Electrical
- Mechanical
  - Kinetic
  - Potential
- Hydraulic
- Pneumatic
- Chemical
- Thermal

12

Energy Control Program

- The written program shall identify:
  - Written energy control procedures for each piece of equipment with one or more energy sources;
  - Documented employee training; and
  - Documented periodic inspections.

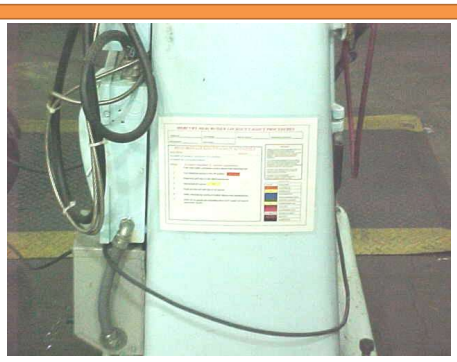
13

Written Energy Control Procedures

- Procedures shall include
  - Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control potentially hazardous energy.
  - Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices and tagout devices and other energy control measures.

14

Example of Procedures



15

General

- Energy sources shall be at Zero Energy State (ZES) during lockout or tagout.
- Interlocks, locking of push buttons, selector switches, and other control circuit type devices do not qualify as energy isolation devices for lockout.

16

Is This Lockout?

17

General

- Removing or bypassing guards or other safety devices to do work requires the equipment to be at ZES (lockout) regardless of the task being performed.
- Servicing or maintenance tasks that are not considered part of "normal production operations" require the equipment to be locked out.

18

General

- During servicing and maintenance that is not part of normal production operations when an employee is required to place any part of their body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (Point of Operation), or where an associated danger zone exists during a machine operating cycle, the machine shall be locked out.

19

General

- Minor tool adjustments, changes or other minor servicing activities taking place during "normal production operations" not requiring guarding or other safety devices to be removed or bypassed do not fall under the scope of lockout or tagout, they are in the scope of alternate procedures or "energy control".

20

PREAMBLE

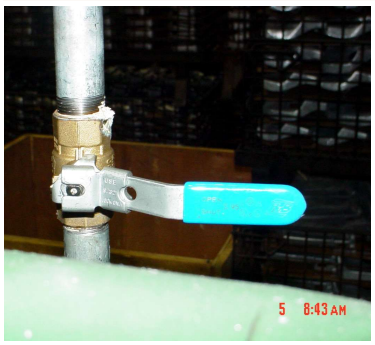
21

General

- No employee shall work under the protection of another employee's lockout or tagout.
- Lockout locks shall be used solely for the purpose of locking energy isolating devices and nothing else (e.g. locking toolboxes or personal lockers).

22

General



- Machine/equipment upgrades or modifications must be able to accept lockout devices. One way to accomplish this is to have the lockout devices integrated into the modifications.

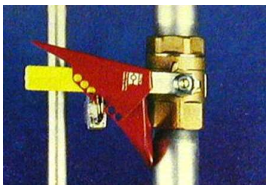
23

Lockout Devices

- The primary lockout device is a keyed padlock.

24

Lockout Devices



25

Lockout Devices

26

Gate Valve Lockout

27

Gate Valve Lockout

28

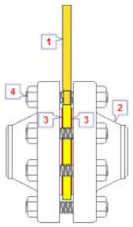
Gate Valve Lockout

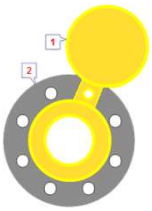
29

Gate Valve Lockout

30

Flange Blinding





31

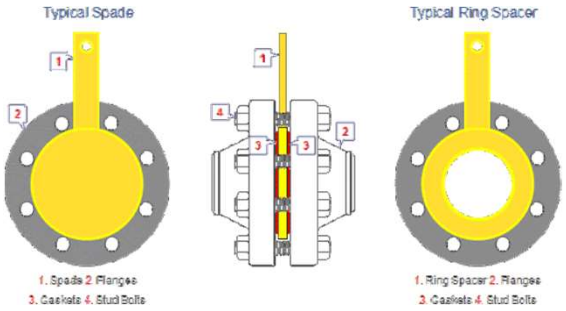
Flange Blinding

32

Flange Blinding

33

Flange Blinding



34

Equipment

- Lockout Tags
  - Used to identify the owner of an individual lockout device. Contains employee's name, photo and a message similar to the following, "DANGER Do not Operate. My life is on the line". One is attached to each individual lockout device applied by an employee.

35

Lockout Process

- Preparation for shutdown
  - Determine energy present and equipment needed to obtain zero energy and notify affected employees
- Machine or Equipment Shutdown
- Machine or Equipment Isolate
- Lockout or tagout device application
- Relieve stored energy
- Verification of isolation

36

Verification Of Isolation or Energy Control

- Before starting work, the authorized employee shall activate the normal operating controls to verify the equipment is at zero energy or controlled energy, which ever is applicable.

37

INDIVIDUAL LOCKOUT
VS.
GROUP LOCKOUT

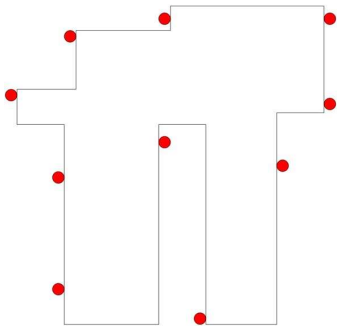
38

39

40

Individual Lockout

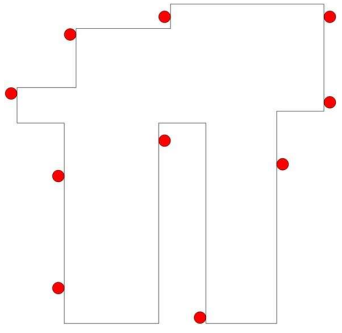
- 20 Employees
- Total number of locks required?
- 200



41

Group Lockout

- 20 Employees
- Total number of locks required?
- 30



42

Safe Start-up Procedures

- Step 1:
  - Notify affected employees
- Step 2:
  - Ensure the area is clear of tools and people
- Step 3:
  - Remove lockout devices and start equipment

43

Lock Removal

- Removal of a lock is done only by the authorized employee responsible for it and is never to be bypassed, ignored, or otherwise defeated.

44

Additional Requirements

- Shift Change
- Temporary Removal of Lockout
- Annual Evaluation
- Contractor Coordination

45

Right or Wrong?

- Wrong. Energy isolating device is not locked.

46

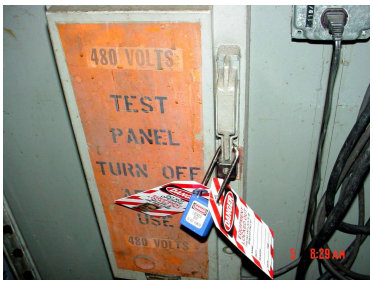
Right or Wrong?

- Wrong. The key is still in the lock

47

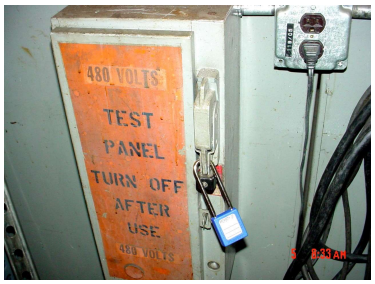
Right or Wrong?

- Wrong. It appears that one employee is working under the protection of another employee's lock.



48

Right or Wrong?



- Wrong. The lock has no tag with it.

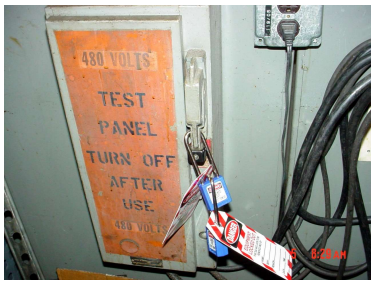
49

Right or Wrong?

- Right.

50

Right or Wrong?

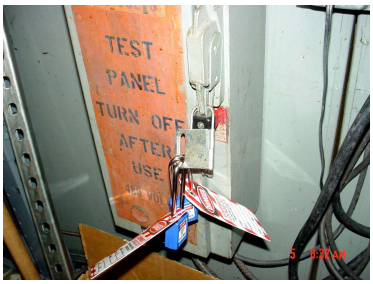


- Wrong. The bottom lock has no control over the energy isolating device.

51

Right or Wrong?

- Right. Hasp used correctly for multiple lockouts.



52

Right or Wrong?

- Wrong. One of the locks does not have a tag with it.

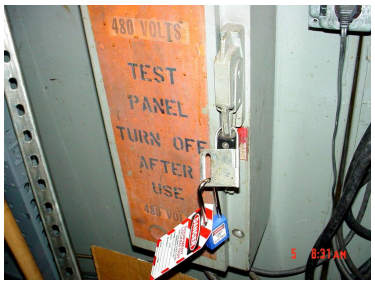
53

Right or Wrong?

- Wrong. This is tagout but tagout can only be used if the energy isolating device can not be locked out.

54

Right or Wrong?



- Right. The employee just opted to use a hasp with his lock.

55

Right or Wrong?

- Wrong. Tag is not to plant standard.

56

Right or Wrong?

- Wrong. The energy isolating device is not in the off position.

57

Right or Wrong?

- Wrong. This is tagout but tagout can only be used if the energy isolating device can not be locked out.

58

Right or Wrong?

- Wrong. One of the tags is not to plant standard.

59

Collaborative Bachelor's Degree Program of Fire Protection and Safety Engineering Technology between Southwest Jiaotong University and Oklahoma State University, U.S.A.

Lockout Injuries are Never, Ever Minor

60

Goodyear Accident

61

Summary

- When machine guarding is removed or safeties are bypassed to perform servicing and maintenance, the machine must be at zero energy and locked out or tagged out

62