The New ANSI Z244.1 - Lockout, Tagout and Alternative Methods

Bruce Main, PE CSP
President
design safety engineering, inc.
Original Need for a Standard

• Too many workers being seriously injured or killed at work.

• These incidents were often a result of the unexpected release of hazardous energy.

• Industry gathered together in mid 1970s to write a standard to control the unexpected release of hazardous energy.
History

• 1982 ANSI Z244.1
• 1989 OSHA 29 CFR 1910.147 based largely on Z244.1
• 1993 ANSI Z244.1 Reaffirmed
• 2003 ANSI Z244.1
• 2009 ANSI Z244.1 Reaffirmed
• 2014 ANSI Z244.1 revision begins
• 2016 ANSI Z244.1
Machine/equip. servicing or maintenance work?

Yes

Apply Lockout/Tagout (1910.147)

No

Apply Machine Guarding (Subpart O)

To Figure 3-2a
OSHA’s View

Normal Production Operation  Service and Maintenance

Lockout Does Not Apply  Lockout Applies

= Exception (As Interpreted)

DRAFT

© 2016 design safety engineering, inc.
Industry View - Based on Plain Language of 1910.147

Normal Production Operations  Service and Maintenance

\[ \text{Where Unexpected Start Could Occur} \]

\[ \text{Exception} \]

\[ \text{S+M} \]

© 2016 design safety engineering, inc.
Z244.1 (2003 R2009) Flow Chart

Figure 1
Decision Matrix for Safeguarding Hazardous Energy

Task requiring access to machine, equipment or process

- Routine, repetitive action? or lockout prohibits task completion?
  - Yes
    - Exposed to hazard? or Guards removed? or Interlocks bypassed?
      - Yes
        - Perform Risk Assessment
      - No
        - Perform Task
        - Apply Alternative method
      - No
        - Alternative method possible?
          - No
            - Perform Lockout / Tagout Procedure
          - Yes
            - Perform Task

© 2016 design safety engineering, inc.
Need for a Standard Revision

• The annual toll of injury and death related to hazardous energy release incidents remains unacceptable.

• Rapid technological growth

• New responses for hazardous energy control

• Standards need continual improvement to keep up with industry advancements.
Z244.1 provides guidance regarding:

- **Responsibilities** of the principal parties involved in hazardous energy control (Clause 4);
- **Design issues** that influence the effective application of control methodology (Clause 5);
- **Hazardous energy control program** elements (Clause 6);
- **Communication and training** requirements for involved personnel (6.4);
- **Hazardous energy program review** to ensure its effectiveness (6.5);
Overview (continued)...

- Hazardous energy *isolation methods* ( Clause 7 )
- *Alternative methods* development for tasks ill-suited to traditional LOTO ( Clause 8 ); and
- *Special applications* where typical methods of hazardous energy control are not practicable (8.4).
- **Annexes**
  - Guidance
  - Tools
  - Examples of alternative methods in various industries
Table 3 - The Hazard Control Hierarchy

<table>
<thead>
<tr>
<th>Protective Measure</th>
<th>Examples</th>
<th>Influence on Risk Factors</th>
<th>Classification</th>
</tr>
</thead>
</table>
| Elimination or Substitution| • Eliminate pinch points (increase clearance)  
• Intrinsically safe (energy containment)  
• Automated material handling (robots, conveyors, etc.)  
• Redesign the process to eliminate or reduce human interaction  
• Reduced energy  
• Substitute less hazardous chemicals | • Impact on overall risk (elimination) by affecting severity and probability of harm  
• May affect severity of harm, frequency of exposure to the hazard under consideration, and/or the possibility of avoiding or limiting harm depending on which method of substitution is applied. | Design Out |
| Guards and Safeguarding Devices | • Barriers  
• Interlocks  
• Presence sensing devices (light curtains, safety mats, area scanners, etc.)  
• Two hand control and two hand trip devices | • Greatest impact on the probability of harm (Occurrence of hazardous events under certain circumstance)  
• Minimal if any impact on severity of harm | Engineering Controls |
| Awareness Devices          | • Lights, beacons, and strobes  
• Computer warnings  
• Signs and labels  
• Beepers, horns, and sirens | • Potential impact on the probability of harm  
• No impact on severity of harm | Administrative Controls |
| Training and Procedures    | • Safe work procedures  
• Safety equipment inspections  
• Training  
• Lockout / Tagout / Tryout | • Potential impact on the probability of harm (avoidance and/or exposure)  
• No impact on severity of harm | |
| Personal Protective Equipment (PPE) | • Safety glasses and face shields  
• Ear plugs  
• Gloves  
• Protective footwear  
• Respirators | • Potential impact on the probability of harm (avoidance)  
• No impact on severity of harm | |
Z244.1 (2016) Flow Chart

Start

Is there a Hazardous Energy Control Program?

No

Establish Hazardous Energy Control Program

Yes

Task requiring access to machine, equipment, or process

Is the energy required during the task?

No

Specify Lockout (preferred) or Tagout

Yes
Z244.1
(2016) Flow Chart

1. Modify task, machine, equipment, or process
   - Yes: Perform and document risk assessment
   - No: Specify Alternative Method(s)

2. Specify Alternative Method(s)
   - Yes: Document procedures
   - No: Perform necessary checks & tests

3. Document procedures
   - Yes: Review by qualified person (if needed)
   - No: Is risk of performing the task acceptable?

4. Review by qualified person (if needed)
   - Yes: Can the risk be lowered by adding Alternate Method(s)?
   - No: Is risk of performing the task acceptable?

5. Is risk of performing the task acceptable?
   - Yes: End
   - No: Can the risk be lowered by adding Alternate Method(s)?
Evaluating Alternative Methods

... shall consist of the following parameters as applicable:

• Practicability / Justification analysis;
• Risk assessment based on the tasks being performed;
• Industry best practices / methods;
• Architecture / Structure;
• Using well-tried components;
• Using well-tried designs;
• Common cause failure;
Evaluating Alternative Methods (cont).

- Fault tolerance;
- Exclusivity of control
- Taper resistance;
- Program to support;
- Procedures in place;
- Periodic checking and testing;
- Reviewed by qualified person.

Not all of the above parameters will necessarily apply to a specific situation.
ANSI Z244.1 (2016)

• Lockout remains the primary method to control potentially hazardous energy.
• Guidance and requirements for Alternate Methods used in lieu of lockout/tagout.
• Enabling use of current technology and solutions.
• Has some fundamental conflicts with OSHA
  – How this will play out remains to be seen
Differences from OSHA...

- WWOD – not part of the discussion
- OSHA was invited, but did not participate
- Service and maintenance construct is OUT
- Alternative methods is IN
- Current knowledge (vs 1989 – 27 years)
- Z244.1 is more enforceable
More Details on the Differences...

1. Introduction 1
2. History 11
3. The New ANSI Z244.1 (2016) 53
4. General Comparison 63
5. Analysis 79
6. The Service and Maintenance Construct 133
7. Summary of Key Legal Cases 157
8. International Activity 203
9. The Reliability of Modern Control Systems 223
10. What is “Good”? 255
11. Potential Solutions 277

Available at www.designsafe.com or on Amazon

© 2016 design safety engineering, inc.
Fundamental Challenge

- Not every control system is ‘bad’
- Not every control system is ‘good’

- How to determine what is ‘good’?
- How to easily inspect/evaluate if an existing control system meets the requirements of ‘good’?
ANSI Z244.1 - 2016

In theater late 2016
OSHA published a notice that it intends to remove the word “unexpected” from the lockout/tagout requirements in 29 CFR 1910.147

**THIS IS IMPORTANT!!!**
One example...

1910.147(b)

*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. (italics emphasis in original)
Implications

• The proposed change will make the use of alternative methods much harder for employers.

• New technology or controls designed to enable safe and quick access for necessary tasks will be prohibited.

• Employers will not be able to demonstrate that there is no exposure to potential unexpected energization.

• As a result, lockout will be required.

• There is no E = 0 under OSHA.
Next Steps...

• As part of its notice, OSHA requests comments on all issues related to this proposed rule

• You need to submit comments!!
Comments...

• The proposed change of eliminating the word “unexpected” from 29 CFR 1910.147 is a substantive change to the standard requirements and should not be allowed without following the rulemaking process as required under the OSHA Act.

• Requiring that only a lockout method be used will have significant negative economic impacts to employers and decrease worker safety, increase operational costs, reduce the global competitiveness of US industries, and result in more worker injuries.

• OSHA’s proposal greatly restricts the ability of employers to make use of alternative methods using current technology and advancements to control hazardous energy.
Contact Information

Bruce Main
President
design safety engineering, inc.
Ann Arbor, Michigan United States

Telephone: +1 (734) 483-2033

bruce@designsafe.com