Lockout/Tagout Risk Assessment: Evaluating Alternative Energy Control

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Introduction

OSHA Lockout/Tagout Standard exempts traditional lockout methods if access to hazardous energy sources or moving machine parts are routine, repetitive and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection (such as interlocked guards). Outlined are risk assessment methods in ANSI Z244.1 to evaluate whether alternative methods will provide proper protection to the worker.

Alternative Methods Definition & Applicability

Traditional lockout applies to, but is not limited to, activities such as, erecting, installing, constructing, repairing, adjusting, inspecting, unjamming, setting up, trouble-shooting, testing, cleaning, dismantling, servicing and maintaining machines, equipment or processes. When these tasks are routine, repetitive, and integral to the production process, or traditional lockout/tagout prohibits the completion of those tasks, alternative methods of control may be used. Task which meet the definition of “routine, repetitive, and integral to the production process” generally exhibit the following characteristics:

– Short in duration
– Relatively minor in nature
– Occur frequently during the shift, day or week
– Usually performed by operators, set-up, service or maintenance personnel
– Do not involve extensive disassembly
– Represent predetermined cyclical activities
– Expected to occur regularly
– Minimally interrupt the production process
– Exist even when optimal operating levels are achieved
– Require task specific personnel training

It is important to note that ANSI Z244.1 requires a risk assessment when alternative methods are used.

Options for Control
Control options include engineered safeguards, warning & alerting techniques, administrative controls, and finally, training. Selection of control methods is based on the risk assessment of the machine, equipment, or process and follows the hierarchy of controls for machine safeguarding/personnel protection set forth in various standards, including ANSI Z244.1. The options for control are summarized as follows:

1. Engineered safeguards
   - Exclusive personal control
   - Control circuit integrity
   - Area scanners
   - Guards
   - Hold-to-run devices
   - Light curtains
   - Pressure mats
   - Safety-rated switches
   - Stop devices
   - Trapped key devices

2. Warning and alerting techniques
   - Attendant
   - Automated warning systems
   - Barricades
   - Warning signs and tags

3. Administrative controls (safe work procedures and practices)
   - Apparel
   - Illumination
   - Preparation for work

4. Training

**Risk Assessment Process**

ANSI Z244.1 does not require specific methodology. However, when performing any risk assessment the assessor should keep in mind two basic variables that address overall risk.

\[
\text{RISK} = \text{LIKELIHOOD OF EXPOSURE} \times \text{SEVERITY OF INJURY}
\]

ANSI Z244.1 specifies that a risk assessment shall include the following elements.

1. *Identification of all tasks*
   This is specially the task identifiable to the machine hazard. Examples include setting up, adjustment, cleaning, unjamming, etc.

2. *Identification of all hazards*
   Hazards including mechanical, electrical, thermal, pneumatic, hydraulic, radiation, residual or stored energy, motion, fuels, and human factors that are associated with each task should be identified.

3. *Assess Potential Consequences.*
   Potential consequences addresses the severity of injuries to all persons that could be harmed by the hazards.

4. *Assess Potential Exposure to Hazards*
Exposures include methods by which the worker can access and reach into the point of operation or hazardous machine part.

5. **Assess Probability of Occurrence**
   Determine the probability of occurrence of the hazardous event by assessing the following factors:
   a) safeguards, safety devices and safety systems either in use or to be used;
   b) reliability history and failure mode;
   c) operational or maintenance demands of the task;
   d) possibility of defeat or failure of safeguards;
   e) accident history relating to the particular task, activity, machine, equipment, or process;

6. **Evaluate Risk**
   Risk evaluation can be quantitative and will determine if it is acceptable. ANSI Z10 Appendix E gives guidance on how risk can be evaluated through risk assessment matrixes. Table 1 gives guidance on performing a quantitative risk evaluation to determine whether risk is acceptable.

<table>
<thead>
<tr>
<th>LIKELIHOOD OF EXPOSURE</th>
<th>CONSEQUENCE/SEVERITY OF INJURY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Catastrophic</td>
</tr>
<tr>
<td></td>
<td>Death or Permanent Disability</td>
</tr>
<tr>
<td>Frequent</td>
<td>5</td>
</tr>
<tr>
<td>Probable</td>
<td>4</td>
</tr>
<tr>
<td>Occasional</td>
<td>3</td>
</tr>
<tr>
<td>Remote</td>
<td>2</td>
</tr>
<tr>
<td>Improbable</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 1-Quantitative Risk Assessment Scoring Summary**

<table>
<thead>
<tr>
<th>LIKELIHOOD OF EXPOSURE</th>
<th>CONSEQUENCE/SEVERITY OF INJURY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High=Operations not permissible</td>
</tr>
<tr>
<td></td>
<td>Serious=High priority remedial action</td>
</tr>
<tr>
<td></td>
<td>Medium=Take remedial action at appropriate time</td>
</tr>
<tr>
<td></td>
<td>Low=Risk Acceptable. Remedial action discretionary</td>
</tr>
</tbody>
</table>

Table 2 gives a sample risk assessment.

<table>
<thead>
<tr>
<th>TASKS</th>
<th>HAZARDS</th>
<th>SEVERITY/EXPOSURE</th>
<th>RISK LEVEL</th>
<th>PROTECTIVE MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove product from process during jam</td>
<td>Crush of hand from process.</td>
<td>Catastrophic/Occasional 4/3</td>
<td>High (12)</td>
<td>Interlock Guard</td>
</tr>
</tbody>
</table>

Table 2-Sample Risk Assessment Format
7. **Determine if Risk is Acceptable**

Acceptable risk refers to the level at which further risk actions will not result in significant reduction in risk, or where additional expenditure of resources will not result in significant advances towards increased safety. Risk reduction is considered complete when protective measures are applied and acceptable risk had been achieved for the identified hazards. If risk is deemed unacceptable in accordance with the risk evaluation process, then the risk reduction process needs to be implemented.

**Risk Reduction Process**

The risk reduction process follows the hierarchy of controls as follows:

1. Design
2. Engineered Safeguards
3. Warning & Alerting Techniques
4. Administrative Controls
5. Personal Protective Equipment

Once risk reduction process has been implemented, the risk assessment process should be repeated.

**Conclusions**

ANSI Z244.1 requires that a risk assessment be performed when alternative means of energy control are implemented. This starts with the risk assessment process to determine if these alternative means will produce acceptable risk. If risk is deemed unacceptable, then the risk reduction process needs to be implement and risk assessment re-performed.

**Bibliography**

