**Lockout/Tagout, ANSI/ASSE Z244.1-2016**

**PS: OSHA inspectors frequently cite lockout/tagout violations. Why does this remain such a challenge for industry?**

**Todd:** Dangerous exposures can vary by machine type and task assignment. It comes down to the need to consistently apply lockout. Three parties must align:

1. The safety department must create and sustain a usable program.
2. Management must provide good practices, sufficient equipment and training, and require it all to be used.
3. Employees must fully participate.

Unfortunately, many incidents occur because workers believe they can save time and make their jobs a little easier by not locking out. A first-time success without lockout gives the false impression that it will work the next time. In reality, it is only a matter of time before the right circumstances come together to create an incident. What often develops is a culture of believing that lockout is not necessary to perform certain jobs because personal skill is all that is required to work safely. Incidents often result when human error or miscommunication cause unexpected startup to occur that consistent, routine lockout could have prevented.

**PS: How does management or the safety department address this pattern and interrupt that chain of events?**

**Todd:** Lockout is usually a production-related or maintenance-related activity. Management determines the best way to do the job, then teaches workers the way to consistently perform the job. Instead of lockout being seen as an extra safety step, it must be incorporated into the way the job is designed to be performed. As a result, lockout/tagout is accounted for in terms of the time and equipment required. It becomes the routine way to work, instead of a safety step that employees believe they can save time and make their jobs a little easier by not locking out. A first-time success without lockout gives the false impression that it will work the next time. In reality, it is only a matter of time before the right circumstances come together to create an incident. What often develops is a culture of believing that lockout is not necessary to perform certain jobs because personal skill is all that is required to work safely. Incidents often result when human error or miscommunication cause unexpected startup to occur that consistent, routine lockout could have prevented.

**PS: What types of energy must OSHA professionals be aware of when addressing lockout/tagout?**

**Todd:** There is a whole list of common energy sources, such as electricity, air pressure, hydraulics, mechanical movement, chemical, and heat and cold extremes. But for each type, we need to be aware that stored energy is often not properly understood, addressed or isolated. This triggers an incident.

Most sites tend well to issues such as electrical disconnects and pneumatic valves. However, the typical assumption is that other energy sources automatically go to zero, which is often not the case. Workers regularly fail to recognize that after they turn off the air pressure between the valve and the actuator that is making activity happen in a machine, stored pressure can still be present. If the start button is pushed or a sensor is triggered the trapped air has plenty of power to make the machine cycle. The mistake is thinking the machine has been locked out when in actuality it can still function.

When I teach lockout procedure writing, I emphasize that the first thing to consider is what position the machine must be in before starting lockout. You do not want to set traps for employees by having elevated or pressure-loaded parts. Everything should be put into a resting position. Then, once the power is turned off, consider what will continue to shed energy as the machine spins down or cools down. Where else is stored energy trapped? For example, if a worker shuts down hydraulic valves before cutting power to the hydraulic pump, pressure can be trapped within the hydraulic system. But if the worker shuts off the hydraulic pump first, then lets the pressure reduce to zero, the employee is not only controlling the primary source of energy, but also dissipating the stored energy that could allow the machine to continue to function.

**PS: How can ANSI/ASSE Z244.1 help employers address these issues?**

**Todd:** Over time, Z244.1 has progressively addressed what many industries around the world have learned about managing a lockout system and how to inform and engage people to protect themselves. OSHA has had a lockout regulation for a long time and enforces it aggressively, yet lockout remains a top citation year after year.

That means people are not using the OSHA regulation properly. This is primarily because it is difficult for employers to implement since it creates barriers for applying lockout to common production processes and maintenance activities where the requirements of the task make it extremely difficult to utilize.

Z244.1 presents a great collection of best-practice ideas proven in progressive workplaces.
with great safety management systems in place.
The standard speaks to a systems approach of
how lockout can be performed versus the more
prescriptive OSHA regulation that addresses what
must be done to comply. The OSHA standard
does not recognize the advances in technology
that workplaces currently use to conduct complex
maintenance and operational activities. ANSI/
ASSE Z244.1-2016 is a guide that lays out how
to get this accomplished by involving safety,
management and personnel in the planning and
execution process.

**PS:** Z244.1 offers alternatives to lockout/
tagout. Will an employer that uses those
alternatives still comply with OSHA’s standard?

**Todd:** The committee decided that our goal was
not to overtly write the standard to match OSHA’s
performance requirements. As an example, con-
sider an expansion of what is called alternative
procedures when lockout cannot be justified from
a practicability or a feasibility basis. OSHA limits
its acceptance of these tasks only to routine and
repetitive production-related activities. The new
Z244.1 standard guides employers to responsibly
review all activities that must be performed where
it is impractical or infeasible to lock out the ma-
chine because power is needed, or when lockout
is an unnecessary process because dependable
alternative methods can provide equivalent, effec-
tive protection.

For example, the current OSHA standard does
not recognize interlock protection as being accept-
able in place of lockout. The standard is 26 years
old and is based on interlock technology of that
time. The Z244.1 committee carefully considered
the latest technology, such as control reliable cir-
cuity and redundant safety systems. OSHA does
not address that in its standard, but the Z244.1
committee included such details to produce a pro-
gressive document. Furthermore, the OSHA
standard does not recognize the warning systems
of a tiered set of methods that can be considered a
protective alternative method.

Suppose a site uses a highly reliable interlocked
gate that people have individual access control
to via a trapped key system with an additional
warning system that visually and audibly sig-
nals impending startup of the machinery. Used
together, these two methods may provide a fully
engineered and dependable safe work condition
that allows an employer to justify not locking out
a machine for certain maintenance-related tasks.
Yet, according to the OSHA standard, this practice
is not acceptable because these tasks are nonpro-
duction activities.

ANSI/ASSE Z244.1 requires a careful analysis
to be performed. First, justify that what you are
doing will not allow lockout to be applied, then
do a risk assessment to determine
whether you have achieved an
acceptable level of control that will
provide a negligible opportunity
for startup to occur. The standard
asks employers to be deliberate
about their thought process and to
document their decision. If workers
are potentially being put in harm’s
way, an employer wants sound,
documented rationale that this is a
consistently reliable method that will
prevent an incident from occurring.

**PS:** Talk a bit more about risk
assessment in relation to lockout/tagout.

**Todd:** The OSHA standard does not typically
require risk assessment because the standard
instructs employers to always take a machine to
zero potential for movement, zero energy, and a
fully isolated state before exposure occurs. The
alternative methods of control in Z244.1 require
a careful practicability and justification analysis.
The Z244.1 standard asks companies to conduct a
task-by-task assessment that answers the ques-
tion, “Why can’t this be locked out?”

If a company cannot cite a sufficient justifica-
tion, then the ANSI/ASSE standard indicates that
lockout should be the default method applied to
protect workers because that is considered the
best method.

When doing a practicability analysis, the com-
pany first justifies why lockout would be impracti-
cal. Then they must consider ways to minimize
employee exposure through design and hazard
elimination. The next step is to identify the ap-
plicable potential alternative methods that could
determine which alternative will work the best.
The time required varies by machine, as well as
task performed, but it is a straightforward process
in terms of the questions and determinations
required.

Next comes risk assessment. The Z244.1
standard discusses risk-assessment practices for a
wide range of industries in several annexes deal-
ing with robotics, the plastics industry, the print-
ing industry, pharmaceuticals and many others.
The standard prompts employers to determine,
from a risk-assessment basis, whether they are
using well-tried components and designs. Are
there common-cause failures of these designs that
employers can predict and address via design or
different equipment? What is the fault tolerance
of this design? This is of particular interest with
interlocked guarding. Where can the errors occur?
How frequently do they occur? Realistically, can
we show this is a highly dependable measure of
control?

Z244.1 also directs employers to use the risk as-
essment process to consider tampering and over-
Can override resistance be defeated without the knowledge of the people who are at risk? For example, if a machine has a simple interlock system that can easily be overridden, an employee could enter a hazardous zone believing that s/he is protected when, in fact, s/he is not. If the machinery activates and that worker is injured, it may be because someone tampered with it or overrode it for some reason.

The latest generation of control interlocks do not allow that kind of tampering or override without providing obvious notice of failure of the safety system and the engagement of other safety control measures requiring individualized participation.

Once control measures are identified, the standard directs the employer to have other qualified personnel review and verify the alternative procedure to be sure it offers an equivalent level of protection to locking out the machinery. It is a pretty smart process. The tasks that an employer should apply these methods to are typically routinely occurring and high-value tasks. They should not be applied to low-frequency or poorly understood task assignments, especially on machinery with insufficient guarding or protective systems.

**PS: The process sounds complex as well as time-consuming. Can small employers benefit from this process?**

**Todd:** The standard is really designed for all sizes of business operations. ANSI/ASSE Z244.1 is based on safety management system theory, which is scalable to the size of the operation. Generally speaking, large and sophisticated manufacturing companies have the human, administrative and physical resources to consistently practice lockout when indicated. They expect employees to do this and they can account for machines being down in their production process by other redundant production and planned maintenance.

Small manufacturers often say they are challenged to lockout because they cannot routinely stop the line and maintain profitability. The methodology explained in Z244.1 applies to these circumstances because it helps these manufacturers clarify when lockout must be applied, and when alternative procedures are justified by conducting a straightforward risk assessment and then documenting the decision-making process that validates the alternative procedures selected.

Remember, when considering the cost of doing business, and when faced with a catastrophic incident, a small business owner often has an important decision to make. Can you accept your obligation to pay OSHA penalties and higher insurance premiums that you could have prevented with upfront analysis and training?

First, the standard is dated and not easy to apply, making it difficult to implement in workplaces that face no regulatory pressure to take some of the steps the OSHA standard demands. Second, many international companies are reluctant to adopt a U.S. regulation. ANSI/ASSE Z244.1 presents an attractive alternative. It is a modern standard that considers available technology and engineered solutions while providing an effective approach based on participation, communication and a best-practices methodology. Fully adopting Z244.1 requires an employer to implement all the protective elements, but an employer can also select certain elements that work well with other safety measures already in place that will have the most positive effect on reducing risk and controlling exposures. With the OSHA standard, it is all or nothing. Consider this example.

Section 5 of Z244.1 focuses on machine and equipment design. Manufacturers should design equipment to be locked out and provide guidance to users as to how a specific machine should be locked out. A Chinese manufacturer may want to emphasize that its machine has been designed to be compliant with Z244.1-2016, and will tell buyers what tasks must be done under lockout to safely use this machine.

Next, suppose a Canadian company wants to buy machinery that is lockable. That firm can use the guidance from Z244.1 Section 5 on any machine bid specification order. That way, its manufacturer in Mexico will build the machine to meet those guidelines. These are examples of how the standard can help both manufacturers and buyers on a global scale.

**PS: Why is this standard receiving more global recognition?**

**Todd:** Overseas employers that are not practicing lockout to any great extent are routinely experiencing incidents that affect their workplaces, productivity and workers’ morale. The OSHA 1910.147 regulation is recognized by many European and Asian safety personnel, but this creates two issues.

The new ANSI/ASSE Z244.1 standard acknowledges that smaller businesses will likely employ a more streamlined method than larger companies with more engineering resources and more depth in their safety department. But a benefit exists from a streamlined approach. And once experience has been gained from the first risk assessment performed, it becomes progressively easier to effectively repeat the process for additional tasks involving alternative methods.

**PS: Final thoughts?**

**Todd:** I have great respect and appreciation for the many industries and other interested parties that came together to develop this standard. We all arrived with our own priorities and ideas about best practices, then came to a consensus to make an explanatory standard that takes this critical safety practice to the next level.