

Machine Guarding

Machine guarding keeps workers safe

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amounts for 2023

Exit interpretation
offers flexibility

Chemical agency posts
flurry of incident
investigation reports

Information and resources to help your employees work safely

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MESSAGE FROM THE EDITOR

Protecting workers from machine hazards

Employee exposure to unguarded or ineffectively guarded machines is widespread in many workplaces, leading to thousands of injuries and hundreds of deaths each year. Industries most at risk include agriculture, construction and extraction, transportation, and warehousing. Injury from contact with objects and equipment usually results in six days away from work. Forty-eight percent of injuries impact upper extremities, mainly hands. While 2016 statistics from the National Safety Council found that the age group most at risk is those 16 to 24 years old, any age can be at risk if safety isn't a priority.

This month's Training Blueprint provides an outline you can tailor to your workplace to provide employees with the training needed to stay safe when operating machines or equipment in your facility. The Employee Handout and Quiz can be used to reinforce learning.

While the machine guarding regulations at 1910.212 don't list any employee training requirements — and these regulations aren't alone in that regard — it's still important to provide training when employees are exposed to hazards. ♦



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TRAINING BLUEPRINT — MACHINE GUARDING

Machine guarding keeps workers safe

Each year, workers who operate and maintain machinery suffer approximately 18,000 amputations, lacerations, crushing injuries, and abrasions, and over 800 deaths due to unguarded or inadequately guarded machines.

When the operation of a machine has the potential to injure the operator through accidental contact, or to injure others in the vicinity, the hazards must be eliminated or controlled. OSHA's machine guarding standard at 1910.212 requires that any machine part, function, or process that may cause injury be safeguarded.

Overview

While there are no training requirements listed in 1910.212, it's important that machine operators know:

- The hazards of the machinery,
- The kinds of safeguards protecting them,
- What to do if something is wrong with a machine safeguard, and
- What protections are necessary when a safeguard is removed.

Specific training elements

1. Describe how you assess machine hazards.

New equipment is usually guarded, but onsite equipment modifications often create a need for additional or modified guarding methods. The need for machine guarding is identified by conducting a hazard analysis on new and modified machinery. The results from the analysis are then used to evaluate the need for, and the design of, machine safeguarding.

2. Review your machine operation safety rules.

Understanding how a machine operates is the first step in understanding how machine guarding provides protection. Follow all the manufacturer's instructions, and don't attempt to operate a machine until you've received training. You may have to observe and learn from an experienced machine operator before you can safely use equipment on your own.

TRAINER'S NOTE: Let trainees know where they can access machine operating manuals.

3. Review safe work practices.

It isn't enough to know the hazards and the machine's operating instructions. Be sure to follow established safe work practices as well.

Often, tools are used to feed stock into a machine or to hold material in place while it's being worked on. Using the tool helps keep hands away from a point-of-operation hazard. Other types of work practice safeguarding aids include using awareness barriers (chains, warning lights, alarms, etc.) and portable protective shields.

Don't wear loose-fitting clothes, jewelry, torn clothing, shorts, open-toed shoes — or personal protective equipment — that can get caught in a machine's point of operation. Also, contain long hair that can become entangled in moving machine parts.

If a machine hazard is out of reach during normal operation, additional protection isn't required. For example, an exposed gear higher than seven feet off the ground might not require shielding because it is too far away from an employee

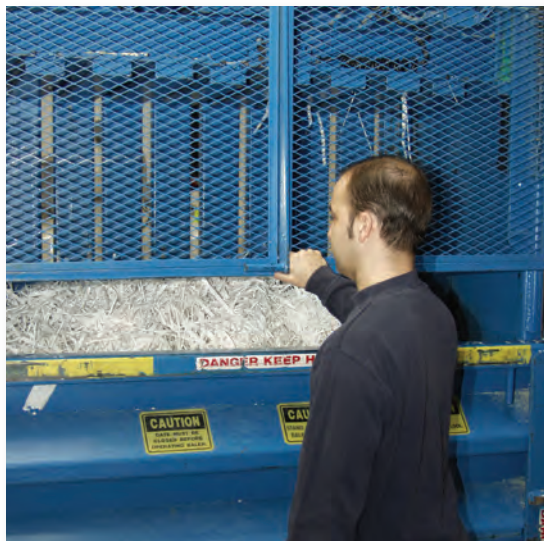
during normal operation. The same may be true of moving parts shielded from employees because they are against a wall and are not accessible. Positioning a machine as a safeguarding option is called guarding "by location."

Other safeguards must be in place when safe work practices and machine location don't provide enough protection.

4. Describe the general types of machine hazards.

The following types of machine hazards are identified during the hazard analysis:

- **Point-of-operation:** These are points where work is performed on the material (i.e., cutting, boring, shaping, forming, grinding, etc.);
- **Power transmission:** Parts that move energy through the machine (i.e., flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, gears, etc.); and



- **Other moving parts:** These include reciprocating, rotating, and transverse moving parts; feed mechanisms; chips and flying material; sparks; etc.

These classifications often overlap. The key is to understand how the machine operates, identify the hazards, and determine how to appropriately guard for each hazard.

TRAINER'S NOTE: Describe some of the machine hazards found at your facility.

5. Introduce the general types of machine safeguarding.

- **Guards** — Barriers that prevent access to danger areas. Guards come in three types: fixed (can't be removed easily — these provide the most protection), interlocked (shut off or disengage power when removed — these are designed to be occasionally removed), and adjustable (adjust for different machine set-ups).
- **Devices** — Stop a machine or prevent it from starting until the operator is in a safe position. These are used mostly for point-of-operation hazards. Devices come in five types: presence-sensing (light, radio frequency, etc.), pullback, restraint, safety controls (trip wires, two-handed trips, etc.), and gates.
- **Automated feeding and ejection methods** — Limit hazards associated with feeding stock into or ejecting material from a machine. These methods come in three types: automated feed or ejection, semi-automatic feed or ejection, and robotics.

TRAINER'S NOTE: Give examples of how the various guarding methods are used on your machines. Consider giving a tour or showing pictures of the different types of guards used in your facility, such as fixed, interlocked, adjustable, etc.

6. Emphasize the importance of safeguards.

Machines are not safe to operate if any safeguard is missing or damaged. Always report missing or damaged safeguards right away. If a machine has adjustable guards, always make sure they are adjusted properly for the job before you start the machine. Never bypass a safeguard.

Safeguards may only be removed during repair and maintenance activities. Repair workers follow a strict lockout/tagout program to ensure that a machine will not start unexpectedly during repairs or maintenance. Lockout/tagout plays an essential role in the prevention and control of machine-related injuries.

TRAINER'S NOTE: Remind trainees of how to report damaged or missing guards. Give examples of machine-related operations that require lockout/tagout before they can be performed.

7. Review your machine safeguarding policies.

It's a good practice to have an organized machine safeguarding program and policies that:

- Assign program responsibility;
- Clarify safeguarding objectives;
- Provide for hazard analysis, and identify machine safeguarding weaknesses;
- Outline the response to identified and reported safeguarding problems; and
- Describe the training program. ♦

TRAINER'S NOTE: Explain how these concerns are addressed in your facility.



Key to remember: While 1910.212 covers general requirements for all machinery, OSHA also has some machine-specific standards, covered in 1910.213 - .219, that may apply to your workplace operations.





Employee Handout — Make sure machine guards are in place

Machine guarding plays a critical role in preventing machine-related injuries. However, machine operators must also follow proper procedures, recognize and report hazards, and properly use/adjust machine safeguards whenever using any machine.

Look at the instructions

Learn and follow the operating instructions before using any machine. Find out how to:

- Do a thorough pre-start-up inspection;
- Adjust the machine (including any adjustable guards and devices);
- Use the machine's controls to start, run, and shut down the machine under normal operations; and
- Perform emergency shut-down procedures.

Follow other safe work practices, too. Never wear loose-fitting clothing or have loose long hair near moving machine parts. Pay attention to warning signs, alarms, and access barriers. You may have to use special tools to feed material into the machine, or you may have to set up shields to contain chips, sparks, or sprays.



Look for the hazards

Examples of mechanical hazards that can hit, grab, crush, or trap an operator are:

- **Hazardous motions** — rotating machine parts, sliding parts or up/down motions, power transmission belts, etc.;
- **Points of operation** — the areas where the machine cuts, shapes, or forms materials; and
- **Pinch points and shear points** — areas where a part of the body can be caught between a moving part and an object.

Look for the safeguards

Some machines can be positioned so that workers can't encounter any hazards. If guarding by location isn't possible, the machine must have safeguards. There are several types of safeguards:

- **Guards** — Prevent contact. They can be fixed, interlocked, adjustable, or self-adjusting.
- **Devices** — Limit or prevent access. They can be presence-sensing devices, pullback or restraint straps, safety trip controls, two-hand controls, or gates.
- **Feeding and ejection methods** — Eliminate the operator's exposure to the point of operation while handling stock.

Look at the machine

Check that a machine's fixed guards are secure, in proper alignment, and intact each time you do a pre-start-up inspection. Check adjustable guards for proper operation and any visible damage. Test emergency stop mechanisms to make sure they're functioning properly.

Report missing or damaged guards right away. Don't use the machine if the guards are missing, inoperative, or damaged. Always keep the guards in place while you operate a machine. ♦

Quiz — Make sure machine guards are in place

For each question, show if you think the statement is **True** or **False**.

- | | | |
|--|------|-------|
| 1. All hazards are due to rotating parts. | True | False |
| 2. Only a mechanic can check guards for visible damage. | True | False |
| 3. Review the operating instructions to find out how to run the machine. | True | False |
| 4. Only safeguarding devices must be adjusted before starting the machine. | True | False |
| 5. Never wear loose clothing near moving machine parts. | True | False |

NAME: _____

DATE: _____



OSHA increases penalty amounts for 2023

OSHA, along with other Department of Labor (DOL) agencies, increased penalties for 2023. The Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015 (Inflation Adjustment Act) requires the DOL to adjust its civil money penalty levels for inflation by mid-January each year.

This year, OSHA penalty amounts went into effect on January 17, 2023.

- §1903.15(d)(1) — Willful violation, minimum increased by \$802 (a penalty of \$11,162 for 2023)
- §1903.15(d)(1) — Willful violation, maximum increased by \$11,232 (a penalty of \$156,259 for 2023)
- §1903.15(d)(2) — Repeated violation increased by \$11,232 (a penalty of \$156,259 for 2023)
- §1903.15(d)(3) — Serious violation increased by \$1,123 (a penalty of \$15,625 for 2023)
- §1903.15(d)(4) — Other-than-serious violation increased by \$1,123 (a penalty of \$15,625 for 2023)
- §1903.15(d)(5) — Failure to correct violation increased by \$1,123 (a penalty of \$15,625 for 2023)
- §1903.15(d)(6) — Posting requirement violation increased by \$1,123 (a penalty of \$15,625 for 2023) ♦



Exit interpretation offers flexibility

OSHA now gives a thumbs up to using the International Standards Organization (ISO) 7010 emergency exit symbol (the moving person symbol) next to the mandatory EXIT text of an exit sign per 29 CFR 1910.37 for general industry. Similarly, the agency okays using the ISO 7010 arrow symbol next to the EXIT text. That's according to a posted letter of interpretation dated May 25, 2022.

The interpretive letter also explores the do's and don'ts of using these ISO symbols and colors on an exit sign for the purposes of NFPA 101-2009, *Life Safety Code*, and NFPA 170, *Standard for Fire Safety and Emergency Symbols*. ♦

Chemical agency posts flurry of incident investigation reports

Celebrating its 25th anniversary, the Chemical Safety Board issued three final investigation reports:

1 12/19/2022 — This 72-page report identifies four issues that contributed to an incident involving a pipe rupture that released highly flammable butadiene that ignited. A blast damaged nearby homes and buildings.

2 12/21/2022 — This 182-page report details a chain of process safety management (PSM) failures that led to the build-up of pressure inside a chemical reactor following a scheduled maintenance shutdown. A CSB video animation depicts the incident and the events leading up to it.

3 12/29/2022 — This 196-page report identifies six safety issues related to a refinery explosion/fire and the release of 39K pounds of flammable hydrocarbon vapor while the refinery was shutting down a fluid catalytic cracking unit for maintenance. The report calls on OSHA and EPA to take action to address these issues nationwide. ♦



Answers to quiz on page 5:

1. False; 2. False; 3. True; 4. False; 5. True



Next Month's Topic: Process Safety Management (PSM)

Compliance with the process safety management (PSM) standard (1910.119) helps ensure that employees, contractors, facility visitors, and emergency responders are safe from these hazards. Employers must provide initial and refresher training to every employee involved in operating a PSM-covered process.

Expert Help: Questions of the Month

Question: Do machine guards and guarding need to be safety color-coded with yellow or orange?

Answer: No, there are no requirements to color machine guards and guarding yellow, orange, or any other color. According to 29 CFR 1910.144(a)(3), yellow shall be the basic color for designating “caution” and for marking physical hazards such as striking against, stumbling, falling, tripping, and “caught in between.” However, this regulation was not meant to state directly or by implication that all machine guards be painted yellow.



Question: What standard covers guarding of calendar stacks?

Answer: 1910.261(k)(18) addresses the hazard of nip points on calendar rolls and gives alternatives as to the method of eliminating or minimizing this hazard. The abatement methods listed in the standard would be acceptable so long as exposure to the hazard is eliminated or minimized. The standard contained in 1910.261(k)(18) is specific to the hazard of nip points on all calendar rolls in pulp, paper, and paperboard mills. However, nip point hazards, when paper is not being fed into the calendar stack rolls, shall be guarded in accordance with a general standard such as 1910.212, which does apply in such a situation. ♦

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Policyholders with as
near perfect protection,
as near perfect service
as is humanly possible,
and to do so at the
lowest possible cost.”***

***Co-founder H.O. Hirt
Our Founding Purpose***