

Top OSHA Workplace Violations



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Fall Protection—General Requirements - Regulation 29 CFR 1926.501

Ranking: 1

A Workplace Story

From a National Institute for Occupational Safety and Health (NIOSH) Fatality Assessment and Control Evaluation (FACE) report:

On a hot April day in North Carolina, a crew was installing sheets of plywood and roof trusses on a residential roof. One of them, a 22-year-old Hispanic worker, was temporarily out of sight of his co-workers when they heard his body hit the ground. He'd fallen 41 feet from an unprotected edge onto the concrete driveway below. He died instantly. It was his second day on the job.

Investigators found that none of the crew had done roofing work prior to that day. They were not provided with fall-protection systems or with personal fall-arrest systems. They received no training in the recognition and avoidance of fall hazards prior to beginning the roof work.

The investigation also revealed that neither the site supervisor nor the company's vice president were aware of the existence of a company safety and health program. The home office eventually located a "Guide for Employees" that listed 19

safety-related guidelines for employees of the company, and stated that "no one is allowed on a roof without OSHA-approved safety equipment." However, there was no information about safety equipment, including how fall protection on roofs was to be addressed. The employer did not have a written safety and health program onsite.

The Numbers

Enforcement from October 2019 through September 2020

Total citations 4,602

Total inspections: 4,487

Total proposed penalties: \$24,977,808

Industries most often violating the Fall Protection—General Requirements standard:

Construction: \$24,556,434

Wholesale Trade: \$158,842

Administrative and Support and Waste Management and Remediation Services: \$62,151

Manufacturing (part 3 of 3): \$37,370

Utilities: \$83,100

Real Estate and Rental and

Leasing: \$24,941

Professional, Scientific, and Technical Services: \$12,158

Retail Trade (part 1 of 2): \$27,952

Agriculture, Forestry, Fishing and Hunting: \$6,747

Retail Trade (part 2 of 2): \$6,293

Prevention

There are a number of ways employers can protect workers from falls, including through the use of conventional means such as guardrail systems, safety net systems and personal fall protection systems, the adoption of safe work practices, and the provision of appropriate training. The use of warning lines, designated areas, control zones and similar systems are permitted by OSHA in some situations and can provide protection by limiting the number of workers exposed. Whether conducting a hazard assessment or developing a comprehensive fall protection plan, thinking about fall hazards before the work begins will help the employer to manage fall hazards and focus attention on prevention efforts. If personal fall protection systems are used, particular attention should be given to identifying attachment points and to ensuring that employees know how to properly use and inspect the equipment.

Compliance

To comply with 1926.501 and prevent employees being injured or killed in falls, employers must:

Provide adequate fall protection to employees who are exposed to fall hazards. According to 29 CFR 1926.501 (b)(1), each employee on a

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walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

Develop, implement, and enforce a written, comprehensive safety program. 29 CFR 1926 (20)(b)(1),(2) holds employers responsible for developing safety programs that are designed to prevent worker injury. These safety programs are to provide for frequent and regular inspections of the jobsites, materials and equipment. They are to be done by a competent person designated by the employer. The evaluation of tasks to be performed at the worksite forms the basis for development, implementation and enforcement of a safety program. Key elements of such a program should include, at a minimum, frequent and regular inspections by a competent person and should include provisions for training employees in hazard identification, avoidance and abatement.

Provide training to workers in the recognition and avoidance of unsafe conditions and the required safe work practices that apply to their normal and to any new work environments. 29 CFR 1926 (21)(b)(2) requires employers to instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment to control or eliminate any hazards or other exposure to injury or illness. Whenever employees are asked to perform new tasks, employers should provide them with the training they need to perform the job safely. In this incident, the victim and his crew members were assigned to new tasks, roofing work, without the benefit of training in how to recognize and avoid fall hazards. Employers should refer to OSHA regulation CFR 1926.503 (a) for specific training requirements. If training cannot be provided prior to the start of work, the work should be delayed until the training can be provided or until a trained crew is available.

Ensure that workers who are part of a multilingual workforce comprehend instructions in safe work procedures for the tasks to which they are assigned. Companies that employ workers who do not understand English should identify the languages spoken by their employees, and design, implement and enforce a multi-language safety program. The program, in addition to being multi-language, should include a competent interpreter to explain worker rights to protection in the workplace, safe work practices workers are expected to

adhere to, specific safety protection for all tasks assigned, ways to identify and avoid hazards, and who they should contact when safety and health issues arise. Also, the employer should develop, and post in conspicuous places, safety posters/signs in that/those languages. ■



Guardrail systems, safety net systems and personal fall protection systems help prevent workplace falls, along with safe workplace practices and fall prevention training. © tosspra - stock.adobe.com

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Hazard Communication Standard, General Industry - Regulation 29 CFR 1910.120

Ranking: 2

A Workplace Story

From a California FACE report:

A 23-year-old associate working in a university research laboratory used a syringe and needle to extract a pyrophoric chemical (t-butyl lithium) from a bottle. When the plunger came out of the syringe barrel, the t-butyl lithium – which was an air-sensitive reagent - ignited on contact with room air. The chemical splashed onto the victim's clothing and set them on fire. (She was not wearing a laboratory coat at the time of the incident.) She died of the burn injuries she sustained.

The victim had been employed with the university for eleven weeks when the incident occurred. The employer had a written Injury and Illness Prevention Program (IIPP) and laboratory safety manual that required each research laboratory to have a written safe operating procedure (SOP) for the use of each hazardous chemical or substance. The principal investigator for each laboratory was responsible for preparing the SOP and training their employees and research staff on the safe handling of chemicals, including air-sensitive reagents

such as t-butyl lithium. Although the principal investigator of the lab where the victim had worked said she'd received verbal instruction on the safe use of pyrophoric chemicals, there was no written documentation of her receiving any laboratory safety training.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 49

Total inspections: 24

Total proposed penalties: \$174,174

Industries most often violating the hazard communication standard:

Manufacturing (part 2 of 3): \$45,665

Transportation and Warehousing (1 of 2): \$10,410

Manufacturing (part 1 of 3): \$31,830

Accommodation and Food

Services: \$25,200

Public Administration: \$19,506

Manufacturing (part 3 of 3): \$9,516

Transportation and Warehousing (2 of 2): \$10,311

Health Care and Social

Assistance: \$5,205

Retail Trade (part 2 of 2): \$9,639

Wholesale Trade: \$4,000

Prevention

Controlling exposures to chemical hazards and toxic substances is the

fundamental method of protecting workers. A hierarchy of controls is used as a means of determining how to implement feasible and effective controls.

OSHA's longstanding policy is that engineering and work practice controls must be the primary means used to reduce employee exposure to toxic chemicals, as far as feasible, and that respiratory protection is required to be used when engineering or work practice controls are infeasible or while they are being implemented.

Eliminating toxic substances or substituting safer alternatives for them is one recommendation from OSHA.

Engineering controls include:

- Change process to minimize contact with hazardous chemicals
- Isolate or enclose the process
- Use of wet methods to reduce generation of dusts or other particulates
- General dilution ventilation
- Use fume hoods

Administrative and workplace controls include:

- Rotate job assignments
- Adjust work schedules so that workers are not overexposed to a hazardous chemical

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Personal protective equipment (PPE) may include:

- Chemical protective clothing
- Respiratory protection
- Chemical resistant gloves
- Eye protection

Compliance

Under OSHA's Hazard Communication Standard (HCS), chemical manufacturers, distributors and importers must provide Safety Data Sheets (SDSs) for each hazardous chemical to downstream users

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to communicate information on these hazards. The information contained in the SDS is required to be presented in a consistent user-friendly, 16-section format. It should include the properties of each chemical; the physical, health and environmental health hazards; protective measures; and safety precautions for handling, storing and transporting the chemical. It must be in English (although it can be in other languages as well).

Employers that have hazardous chemicals in their workplaces are required by OSHA's Hazard Communication Standard (HCS), 29 CFR 1910.1200, to implement a hazard communication program. The program must include labels on containers of hazardous chemicals, safety data sheets (SDSs) for hazardous chemicals, and training for workers. Each employer must also describe in a written program how it will meet the requirements of the HCS in each of these areas.

Employers can implement an effective hazard communication program by following these six steps:

Step 1. Learn the Standard/Identify Responsible Staff

- Obtain a copy of OSHA's Hazard Communication Standard.
- Become familiar with its provisions.
- Make sure that someone has primary responsibility for coordinating implementation.
- Identify staff for particular activities (e.g., training).

Step 2. Prepare and Implement a Written Hazard Communication Program

- Prepare a written plan to indicate how hazard communication will be addressed in your facility.
- Prepare a list or inventory of all hazardous chemicals in the workplace.

Step 3. Ensure Containers are Labeled

- Keep labels on shipped containers.
- Label workplace containers where required.

Step 4. Maintain Safety Data Sheets (SDSs)

- Maintain safety data sheets for each hazardous chemical in the workplace.
- Ensure that safety data sheets are readily accessible to employees.

Step 5. Inform and Train Employees

- Train employees on the hazardous chemicals in their work area before initial assignment, and when new hazards are introduced.
- Include the requirements of the standard, hazards of chemicals, appropriate protective measures and where and how to obtain additional information.

Step 6. Evaluate and Reassess Your Program

- Review your hazard communication program periodically to make sure that it is still working and meeting its objectives.
- Revise your program as appropriate to address changed conditions in the workplace (e.g., new chemicals, new hazards, etc.).



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Respiratory Protection, General Industry - Regulation 29 CFR 1910.134

Ranking: 3

A Workplace Story

A California Fatality Assessment and Control Evaluation (CA/FACE) Program report:

A bathtub refinisher, working alone in a small apartment bathroom, died of methylene chloride exposure while using the chemical to remove paint from a bathtub. The victim was not wearing any respiratory protection. The bathroom had a small, open window but no mechanical ventilation. The victim was the sole employee of a company that specialized in refinishing bathtubs and sinks.

In response to the incident, the CA/FACE Program recommends that safer paint removal products be used, but if a methylene chloride-containing paint remover is used, it should only be done in a well-ventilated bathroom, by someone wearing polyvinyl alcohol (PVA) or Silvershield® gloves and an airline respirator.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 2,757

Total inspections: 1,150

Total proposed penalties: \$4,887,192

Industries most often violating the respiratory protection standard:

Health Care and Social Assistance: \$2,730,216

Manufacturing (part 3 of 3): \$577,613

Construction: \$391,025

Manufacturing (part 2 of 3): \$330,312

Other Services (except Public Administration): \$123,753

Wholesale Trade: \$90,813

Administrative and Support and Waste Management and Remediation Services: \$180,433

Manufacturing (part 1 of 3): \$121,295

Retail Trade (part 1 of 2): \$51,379

Transportation and Warehousing (1 of 2): \$60,498

Prevention

Respiratory hazards are due to exposure to substances hazardous to health which are small enough to be inhaled or breathed in, such as dust, fumes, spores or bacteria, gases or oxygen-deficient atmospheres. More than one respiratory hazard can be present at the same time. Sometimes, substances absorbed through the skin can also be hazardous to the respiratory system. Some examples of occupational lung diseases are:

- Asbestosis. This condition is caused when a person breathes in tiny asbestos fibers.

- Coal worker's pneumoconiosis or black lung disease. This is caused by inhaling coal dust.
- Silicosis, which is caused by breathing in airborne crystalline silica.
- Byssinosis, caused by breathing in dust from hemp, flax and cotton processing. It is also known as Brown Lung Disease.
- Hypersensitivity pneumonitis, an allergic lung disease caused by a lung inflammation that happens from breathing in fungus spores, bacteria, animal or plant protein, or certain chemicals. They can come from moldy hay, bird droppings and other organic dusts.
- Work-related asthma, caused by breathing in dusts, gases, fumes and vapors. It causes asthma symptoms such as a chronic cough and wheezing.

The types of devices used to protect workers from respiratory hazards include:

- Elastomeric Half Facepiece Respirators are usable and have replaceable cartridges or filters. They cover the nose and mouth and provide protection against gases, vapors or particles when equipped with the appropriate cartridge or filter.

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- Elastomeric Full Facepiece Respirators are reusable and have replaceable canisters, cartridges or filters. The facepiece covers the face and eyes, which offers eye protection.
- Filtering Facepiece Respirators are disposable half-facepiece respirators that filter out particles such as dusts, mists and fumes. They do NOT provide protection against gases and vapors.
- Powered Air-Purifying Respirators (PAPRs) have a battery-powered blower that pulls air through attached filters, canisters, or cartridges. They provide protection against gases, vapors or particles when equipped with the appropriate cartridge, canister or filter. Loose-fitting PAPRs do not require fit testing and can be used with facial hair.
- Supplied-Air Respirators are connected to a separate source that supplies clean, compressed air

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Employers must provide respirators to protect workers exposed to inhalation hazards when exposure cannot be controlled by engineering or administrative controls. © chalongrat - stock.adobe.com

through a hose. They can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH).

- Self-Contained Breathing Apparatus (SCBAs) are used for entry into or escape from environments considered to be IDLH. They contain their own breathing air supply and can be either open circuit or closed circuit.
- Combination Respirators can be either a supplied-air/SCBA respirator or supplied-air/air-purifying respirator. The SCBA type has a self-contained air supply if primary airline fails and can be

used in IDLH environments. The air-purifying type offers protection using both a supplied-air hose and an air-purifying component and cannot be used for entry into IDLH environments.

Compliance

OSHA requires that each employer must provide respirators to protect workers from workplace hazards during work to prevent inhalation of hazardous materials that cannot be controlled by other measures (i.e., engineering or administrative controls). The employer must establish and maintain a respiratory protection

program, which is compliant with the OSHA respiratory protection standard and provides respirators suitable for their intended purpose.

A respiratory protection program must include a written plan detailing how the program will be administered. In addition to having a written program, the employer must also be able to demonstrate that the program is enforced and updated as necessary. The written program should include:

- Procedure for selecting respirators for use in the workplace
- Medical evaluation of employees required to wear respirators
- Fit testing procedures for tight fitting respirators
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing and discarding, and otherwise maintaining respirators
- Procedure to ensure adequate quality, quantity, and flow of breathing air for atmosphere-supplying air respirators
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use and their maintenance
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Scaffolding, General Requirements, Construction - Regulation 29 CFR 1926.451

Ranking: 4

A Workplace Story

From a Wisconsin FACE report:

A 59-year-old male plaster laborer in Wisconsin died after falling from a scaffold and striking his head on asphalt pavement. The victim and a co-worker had erected the welded tubular scaffolding on the outside wall of a single-story building and planned to bring the railings and access ladder to the worksite the next day. Near the end of the workday, the victim returned extra tools and equipment to the supply truck, removed his safety helmet and returned to the scaffold area. The co-worker was positioned on the top of the unguarded scaffold and heard a clanging sound on the bracing. He turned to see the victim lying on the ground. The victim was transported to a nearby hospital, where he died 6 hours later of head injuries.

The FACE investigator concluded that, to prevent similar occurrences, employers should ensure that safe access is provided to the work platforms of all scaffolds and that adequate fall protection is used by workers on scaffolds.

The company's safety program included a written general safety policy, periodic worksite visits and weekly toolbox safety meetings. Task-specific safety procedures, including working on scaffolds, were unwritten but were communicated verbally to employees. Records had been maintained of employee participation at the safety meetings for over two years, and there was no record that the victim had attended any safety talks related to fall prevention or scaffold safety during that time.

The victim had been employed by the company for 14 years and had worked on scaffolds frequently. The company provided on-the-job training to employees, including training on appropriate use of personal protective equipment. This was the company's first fatality.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 1,939

Total inspections: 948

Total proposed penalties: \$5,755,397

Industries most often violating the scaffolding in construction standard:

Construction: \$5,564,215

Administrative and Support

and Waste Management and Remediation Services: \$23,337

Accommodation and Food Services: \$66,044

Manufacturing (part 3 of 3): \$16,834

Public Administration: \$0

Manufacturing (part 2 of 3): \$12,145

Professional, Scientific, and Technical Services: \$7,602

Real Estate and Rental and Leasing: \$6,091

Transportation and Warehousing (2 of 2): \$26,988

Arts, Entertainment, and Recreation: \$3,239

Prevention

Workers using scaffolds may be injured due to:

- Tip-overs
- Electric shocks
- Structural failures (collapse)
- Falls

Only trained and authorized persons should be allowed to use a scaffold. Training requirements:

- All training must be conducted in a manner and language which the worker is able to understand.
- Training must be provided by a qualified person who recognizes the hazards associated with the type of scaffold being used and who understands the procedures to control or minimize those hazards. Training must include how to safely:
 - Use the scaffold and determine the maximum load limits when handling materials.
 - Recognize and avoid scaffolding hazards such as electric shock, falls from heights and being hit by falling objects.
 - Erect, inspect, move, operate, maintain and repair scaffolds.

Compliance

Employers must ensure the following:

- Follow the manufacturer's allowable load for the casters, scaffold components and platforms, along with

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- recommended bracing to ensure a rigid and structurally sound scaffold.
- Assess the work area, site conditions and work to be performed.
- Conduct a pre-operation inspection to verify that all scaffold components are functioning properly and/or are correctly assembled.
- Keep the platform free from tripping hazards such as hand tools, equipment or materials.
- Lock scaffold wheels with positive wheel and/or wheel and swivel locks to prevent movement while in use.
- Use guardrails which include top rails, midrails and toe boards, or fall protection at working platform heights of 10 feet or higher.
- Stay at least 10 feet away from energized power lines.
- If outriggers are installed, deploy installed outriggers on both sides of the scaffold. All locking pins must be engaged before using the scaffold.

Employers must ensure that workers have been effectively trained in the following:

- Not to stand on the guardrail or use any components of the scaffold or other items (e.g., stepladders, buckets, boxes, barrels, etc.) inside the scaffold to gain additional standing height.
- Not to try to pull yourself from one location to another while standing on the platform.
- Not to use a scaffold if it is incomplete, broken or has

missing or ill-fitting parts which need replacement. Contact your employer immediately.

- Not to move the scaffold with worker(s) on the scaffold when:
 - The worker(s) on the scaffold is unaware of the move and/or the surface under the scaffold is not within 3 degrees of level and free of pits, holes or obstructions.
 - The worker is on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.
 - Manual force is not being applied as close to the base as practicable. Manual force must be applied not more than 5 feet above the supporting surface (1926.452(w)(3)).
 - The height to base width ratio of the scaffold during movement is greater than 2 to 1, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements (such as ANSI/SIA A92.5 and A92.6) (1926.452(w)(6)(ii)).

Employers must retrain employees when inadequacies are observed, changes in worksite conditions occur or when it is believed that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of the scaffold. **WMHS**

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Ladders, Construction - Regulation 29 CFR 1926.1053

Ranking: 5

A Workplace Story

From a California FACE report:

It was raining and the steps of an 8-foot-straight ladder that was leaning against a 3-tiered storage shelf unit at a grocery market were slippery. The 72-year-old part-time grocery worker who was on the ladder on that January morning fell backward off it and landed on the concrete surface below. Co-workers helped him to his car, but when he subsequently lost consciousness, called 911. He was transported by ambulance to a local hospital where he died from his injuries 20 days later.

The employer, a small, independent grocery store, did not have a written injury and illness prevention program (IIPP) and did not safety meetings. Training was typically accomplished by on-the-job-training (OJT) - observing other workers perform their work tasks. There was no specific training on the safe use of ladders. The victim had no known underlying health conditions. He'd worked

part-time at the market for several years, mostly driving a delivery truck and, when needed, stocking and removing supplies from the store shelves.

The CA/FACE investigator determined that, in order to prevent similar future incidents, grocery markets should:

- Establish and enforce a safety training program that includes the hazards of climbing ladders. If ladders are used in wet conditions, safety precautions should be taken.
- Have older employees who work on ladders assessed for increased fall risk by a healthcare provider.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 1,821

Total inspections: 1,026

Total proposed penalties: \$11,962,667

Most Frequently Violated OSHA Standard Ranking – Number 6

Industries most often violating the ladders in construction standard:

Manufacturing (part 3 of 3): \$2,767,636

Manufacturing (part 2 of 3): \$3,524,980

Manufacturing (part 1 of 3): \$3,329,338

Wholesale Trade: \$834,267

Administrative and Support and Waste Management and Remediation Services: \$357,927

Other Services (except Public Administration): \$244,676

Transportation and Warehousing (2 of 2): \$211,054

Construction: \$123,625

Retail Trade (part 1 of 2): \$148,410

Accommodation and Food Services: \$68,759

Prevention

Falls are the leading cause of death in construction and every year falls from ladders make up nearly a third of those deaths. These deaths are preventable. Falls from ladders can be prevented and lives can be saved by following safe work practices.

When you want to reach a higher work area, a ladder or stepladder may not always be the best option. Ask these questions before deciding on a ladder:

- Will the user have to hold heavy items while on the ladder?
- Is the elevated area high enough that it would require a long ladder that can be unstable?
- Will they be working from this height for a long time?
- Will they have to stand on the ladder sideways in order to do this work?

If your answer is yes to one of the above questions, consider using something other than a ladder. If possible, bring in other equipment like a scissor lift. If a ladder must be used, use one that has a working platform with handrail barricades on the sides (e.g., a platform stepladder).

Additionally:

- Use the right ladder for the job. For example, ensure the ladder is high enough for you to reach your work area without having to stand on the top rung.
- When using ladders to access another level, secure and extend

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the ladder at least 3 feet above the landing point to provide a safe handhold.

- The base of the ladder should be secured.
- Wear proper footwear (e.g., non-slip flat shoes).
- Place the ladder on stable and level ground. DO NOT place it on an uneven surface.
- Ensure that the ladder is fully extended before starting work.
- Prevent passersby from walking under or near ladders in use by using barriers (e.g., cones) or getting your coworker to act as a lookout.
- Do not work on the top rung of the ladder.
- Maintain three points of contact with the ladder at all times.

Compliance

Among the requirements of OSHA's ladder standard:

- The top or top step of a stepladder shall not be used as a step.
- Ladders shall be used only for the purpose for which they were designed.
- Portable/fixed ladders with structural defects shall either

be immediately marked in a manner that readily identifies them as defective, or be tagged with “Do Not Use” or similar language. Defective portable/fixed ladders shall be withdrawn from service until repaired.

- Ladders shall be maintained free of oil, greas and other slipping hazards.
- Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any situation that could affect their safe use.
- Ladder repairs shall restore the ladder to a condition meeting its original design criteria before the ladder is returned to use.
- Ladders must not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.
- The top or top step of a stepladder shall not be used as a step.
- Do not tie or fasten together ladders to create longer sections unless the ladders are specifically designed for such use.

- Ladders shall be used only on stable and level surfaces unless they are secured to prevent accidental displacement.
- Ladders shall not be moved, shifted or extended while occupied.
- Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- An employee shall not carry any object or load that could cause the employee to lose balance and fall.
- When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail, shall be provided to assist employees in mounting and dismounting the ladder. **WMHS**

Top OSHA Workplace Violations

17

Control of Hazardous Energy (Lockout/Tagout), General Industry - Regulation 29 CFR 1910.147

Ranking: 6

A Workplace Story

From an Oregon Fatality Assessment and Control Evaluation (OR-FACE) report:

Although there was no one nearby to witness what happened when a 23-year-old rubber cutter's head was caught between bars of operating machinery, circumstances suggested that he entered a festoon rubber processing area to retrieve and redirect a rubber strip on a cooling bar that had passed the point where it should have fed onto a conveyor. It is believed that the worker raised his head between the moving cooling bars, and that the bars then forced his head against a structural support for an electrical panel. He was pronounced dead at the scene.

OR-FACE investigators found the following key contributing factors:

- Inadequate equipment safeguard
- Inadequate lockout/tagout program and training

- Inadequate hazard assessment and knowledge of safeguarding equipment
- Inadequate training and assessing workplace hazards

They concluded that to help prevent similar occurrences, employers should:

- Safeguard machinery to protect machine operators and others who work in the area from hazards.
- Implement, enforce, and assess "control of hazardous energy (lockout/tagout)" procedures for machines, equipment and processes where unexpected energization or start-up could cause harm to personnel.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 1,821

Total inspections: 1,026

Total proposed penalties: \$11,962,667

Industries most often violating LOTO standard:

Manufacturing (part 3 of 3): \$2,767,636
Manufacturing (part 2 of 3): \$3,524,980
Manufacturing (part 1 of 3): \$3,329,338
Wholesale Trade: \$834,267
Administrative and Support and Waste Management and Remediation Services: \$357,927
Other Services (except Public Administration): \$244,676
Transportation and Warehousing (2 of 2): \$211,054
Construction: \$123,625
Retail Trade (part 1 of 2): \$148,410
Accommodation and Food Services: \$68,759

Prevention

The Lockout/Tagout Standard helps protect workers from hazardous energy while they are performing service or maintenance on machine and equipment. This rule requires, in general, that before machinery or equipment is serviced, it must be turned off and disconnected from the energy source and locked or tagged out. Covered workplaces must develop

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a written energy control program and put it to use. If your employees service or maintain machines where the unexpected startup, energization or the release of stored energy could cause injury, the standard likely applies to you. The standard applies to all sources of energy, including, but not limited to mechanical, electrical, hydraulic, pneumatic, chemical and thermal energy. The standard does not cover the agriculture, construction and maritime industries or oil and gas well drilling and servicing.

Compliance

A hazardous energy control program should include:

- A designated program coordinator

- Hazardous energy control training for employees. Training in lockout will be given to all new employees as a part of their orientation. Retraining will be conducted whenever there is a change in job assignment, a change in machinery or equipment or process change that presents a new hazard.
- Training records of employees will be maintained by the program coordinator.
- The coordinator will also maintain a listing of all equipment and machines that fall under the hazardous energy control program
- An adequate supply of lockout devices (padlocks) and DANGER tags for use each time a lockout process is performed. These shall be used only for energy control. Prior to the servicing or maintenance of equipment a padlock and DANGER warning tag will be obtained from the Program Coordinator. Each padlock will be keyed differently with no master key or duplicate keys available.
- All equipment must be locked out to protect against accidental or inadvertent operation, when operation could cause injury to personnel. Locks are to be applied and removed only by the authorized employee who is performing the servicing or maintenance.
- No one should attempt to operate locked-out equipment.
- Disciplinary action will be applied if any employee violates these procedures, regardless of whether or not physical harm or equipment damage results.

- At least annually, the Program Coordinator will verify the effectiveness of the energy control procedures.

Specific procedures will be followed for lockout:

- If the machine/equipment is in operation, shut it down by the normal shutdown procedure.
- Operate the appropriate switch, valve, etc., so that the machine/equipment is isolated from the energy source.
- Lock the energy isolating devices, using assigned locks and danger tags.
- Release, restrain or dissipate any stored energy.
- Verify that energy isolation is complete, by attempting to start the affected machinery or equipment in the normal manner.
- After testing, return all operation controls to the “neutral” or “off” positions.

Restoration to normal:

- After service or maintenance is complete, check the area to ensure that no employees are exposed.
- Remove all tools and repair equipment.
- Ensure that all guards have been replaced and all safety interlocks reactivated (if so equipped).
- Verify that the operating controls are in the “off” or neutral position.
- Remove all lockout and tag devices and activate the energy isolation devices to restore energy. **WMHS**

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Top OSHA Workplace Violations

20

Powered Industrial Trucks, General Industry - Regulation 29 CFR 1910.178

Ranking: 7

A Workplace Story

From a NIOSH In-house FACE Report:

A 16-year-old part-time worker died when the forklift he was operating tipped over during a turn occurring as the truck was going from a paved alley onto a gravel surface. The worker, who was not wearing the forklift's seat belt, either jumped or was thrown from the operator's seat and was pinned to the ground by the overhead guard. He was transported to a local hospital, where he was pronounced dead.

An investigation determined that the company had an unwritten safety policy and that orientations for newly hired employees included training in the company's hazard communication program, company history, general safety rules, use of protective equipment and procedures for reporting unsafe conditions and injuries. The victim had been hired 6 weeks before the incident to work part-time after school hours. He had received orientation on his first day of work, along with a hard hat and safety glasses. Although he was not assigned to operate the forklift, he had used it occasionally within the warehouse to move materials while cleaning. This was the company's first fatality.

NIOSH investigators concluded that, to help prevent similar occurrences, employers should ensure that:

- forklifts are operated only by employees trained to use safe operating procedures
- seatbelts should be worn by operators of

sit-down forklifts

- employers comply with child labor laws, which prohibit people under 18 years of age from operating powered industrial trucks.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 1,516

Total inspections: 1,037

Total proposed penalties: \$4,009,343

Industries most often violating the powered industrial trucks standard:

Manufacturing (part 3 of 3): \$721,508

Manufacturing (part 2 of 3): \$585,418

Wholesale Trade: \$541,125

Construction: \$541,125

Transportation and Warehousing (2 of 2): \$493,593

Retail Trade (part 1 of 2): \$277,339

Transportation and Warehousing (1 of 2): \$235,654

Manufacturing (part 1 of 3): \$219,964

Retail Trade (part 2 of 2): \$84,233

Administrative and Support and Waste Management and Remediation Services: \$183,128

Other Services (except Public

Administration): \$31,631

Prevention

The hazards commonly associated with powered industrial trucks vary depending on the vehicle type and the workplace where the truck is used. Each type of truck presents different operating hazards. For example, a sit-down, counterbalanced high lift rider truck is more likely than a motorized hand truck to be involved in a falling load accident,

because the sit-down rider truck can lift a load much higher than a hand truck. Workplace conditions also present different hazards. For example, retail establishments often face greater challenges than other worksites in maintaining pedestrian safety.

The best way to protect employees from injury also depends on the type of truck operated and worksite where it is being used.



Determining the best way to protect workers from injury largely depends on the type of truck operated and the worksite where it is being used. © kamonrat - stock.adobe.com

Determining the best way to protect workers from injury largely depends on the type of truck operated and the worksite where it is being used. Employers must ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of the training and evaluation specified in 29 CFR 1910.178(l)(1).

In terms of forklifts, safely operating the vehicles requires preparation, anticipation and careful attention in order to maintain control of the vehicle at all times.

Pre-operation safety: Inspect and maintain the forklift before use. A vehicle that is in need of repair, defective or in any way unsafe should be removed from service. The problem should be recorded on a log and reported to a supervisor immediately.

Traveling and maneuvering: Use good operating practices to prevent accidents. Operators must always maintain control of the forklift, keep a proper lookout and operate the forklift at speeds safe for the particular operation and worksite conditions.

Load handling: Identify the hazards and recommended practices for each step in the load handling process, including:

- Load composition
- Safe handling preparation
- Approaching
- Mast position
- Fork position
- Lifting the load
- Lowering the load
- High tiering
- Truck trailers and railroad cars

Compliance

Among the requirements of the powered industrial truck standard:

- All new powered industrial trucks acquired and used by an employer shall meet the design and construction requirements for powered industrial trucks established in the “American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969,” which is incorporated by reference as specified in §1910.6, except for vehicles intended primarily for earth moving or over-the-road hauling.
- Approved trucks shall bear a label or some other identifying mark indicating approval by the testing

laboratory. See paragraph (a)(7) of this section and paragraph 405 of “American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969”, which is incorporated by reference in paragraph (a)(2) of this section and which provides that if the powered industrial truck is accepted by a nationally recognized testing laboratory it should be so marked.

- Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation and maintenance instruction plates, tags or decals shall be changed accordingly.
- The atmosphere or location shall have been classified as to whether it is hazardous or nonhazardous prior to the consideration of industrial trucks being used therein and the type of industrial truck required shall be as provided in paragraph (d) of this section for such location.
- Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of metal dust, including aluminum, magnesium

and their commercial alloys, other metals of similarly hazardous characteristics, or in atmospheres containing carbon black, coal or coke dust except approved power-operated industrial trucks designated as EX may be used in such atmospheres.

- In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers and circuit breakers of trucks shall have enclosures specifically approved for such locations.
- The employer shall ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of the training and evaluation specified in this paragraph (l). **WMHS**

Top OSHA Workplace Violations

22

Fall Protection Training Requirements, Construction - Regulation 29 CFR 1926.503

Ranking: 8

A Workplace Story

From a Massachusetts FACE Occupational Fatality Report:

Three hours into his shift on a cold January day in Massachusetts, a laborer/carpenter lost his balance and fell 24 feet from an exterior second story wall to the frozen ground below. EMS and local police and state police arrived within minutes. The victim was med-flighted to a regional trauma center and died the next day in the intensive care unit. He was 22 years old.

An investigation by Massachusetts' FACE program found the employer – a residential contractor who'd been in business for about a year – did provide fall protection to workers in the form of personal fall arrest systems (PFAS). The employer asked employees to use the PFAS, but did not enforce the use of fall protection. At the time of the incident, the company did not have a safety and health program or a safety and did not provide safety and health training or hold tool box talks with employees.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 1,415

Total inspections: 1,376

Total proposed penalties: \$2,244,088

Industries most often violating fall protection training requirements in construction standard:

Construction: \$2,195,356
Administrative and Support and Waste Management and Remediation Services: \$13,750
Wholesale Trade: \$9,784
Manufacturing (part 3 of 3): \$4,742
Real Estate and Rental and Leasing: \$1,278
Retail Trade (part 2 of 2): \$6,293
Information: \$3,441
Retail Trade (part 1 of 2): \$9,445
Mining, Quarrying, and Oil and Gas Extraction: \$0
Utilities: \$0

Protection

Preventing falls can mean the difference between life and death. Hundreds of workers die from falls each year. A fall can occur in a split second without any time for the worker to react. You can prevent such deaths by planning to get the job done safely, providing the right fall protection equipment and training all workers to use the equipment safely. Having a serious injury or death occur at work affects everyone at a worksite.

Short and direct Toolbox Talks can be a very efficient way to reach workers with health and safety information. Like all training, delivering the information effectively takes preparation and a desire to involve the workers in health and safety at the workplace. Employers may train workers to lead the training or have supervisors provide the training. Studies have shown peer-to-peer training is effective, participatory and well-retained.

Safety meetings work best if the whole crew actively participates. This makes it more interesting and more likely that people will remember the

information you've given them. Here are some ways to encourage everyone to get involved:

- Ask questions instead of simply giving them the information. After you ask a question, wait a short time to let people think. Then, call on volunteers to answer.
- Ask about personal experience. This can help the group see how the topic is relevant to them. You could ask: Has anyone here fallen off a ladder? What happened?
- Make sure everyone has a chance to talk. If a crew member is talking too much, invite someone else to speak.
- Never make fun of anyone or put anyone down, especially for asking questions.

Compliance

- The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.
- The employer shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:
 - The correct procedures for erecting, maintaining, disassembling and inspecting the fall protection systems to be used;
 - The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones and other protection to be used;
 - The role of each employee in the safety monitoring system when this system is used;

Top OSHA Workplace Violations

23

- The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and
- The role of employees in fall protection plans;
- The employer shall prepare a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training.
- When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (a) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:
 - Changes in the workplace render previous training obsolete; or
 - Changes in the types of fall protection systems or equipment to be used render previous training
 - Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill. *WMHS*



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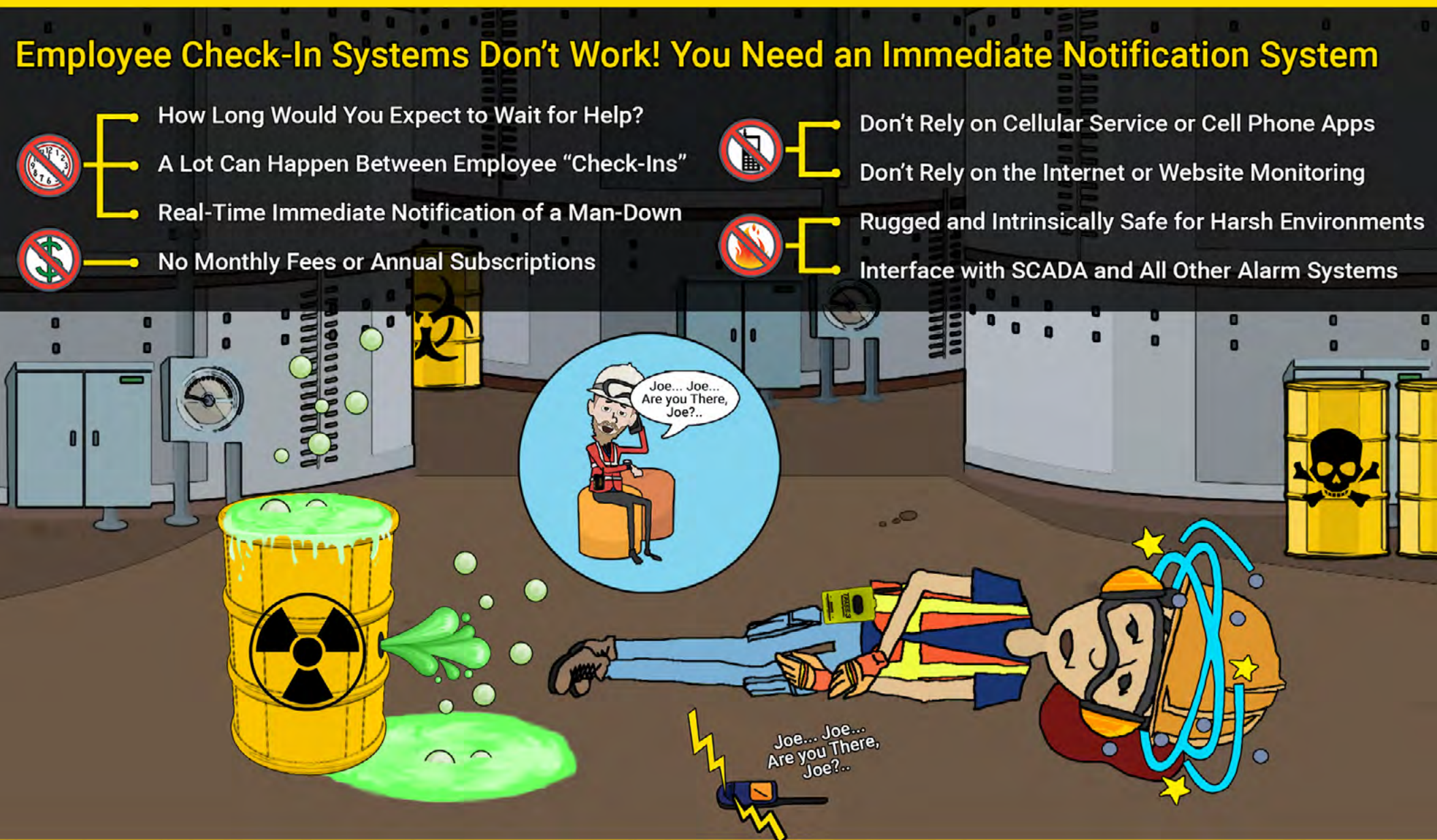
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Eye and Face Protection - Regulation 29 CFR 1926.102

Ranking: 9

A Workplace Story

Barry Weatherall did not wear personal protective equipment (PPE) while he prepared chemicals used for cleaning copper pipes. The plumbing and heating engineer added a neutralizing element to sulfuric acid and then left the immediate area to write a work procedure report while the chemicals neutralized. He removed his safety glasses, a face mask and gloves. When he returned to the work area ten minutes later, wearing only a paper dust mask, the chemicals exploded in his face, blinding him.

Weatherall – who asserted that he'd been given incorrect information from a chemical company about the potential risks of the substances he was working with – went through a difficult adjustment period after the incident. He subsequently devoted his time to traveling to industrial workplaces throughout Canada,

conducting interactive workshops about the importance of on-the-job eye safety and the need to avoid the “it won't happen to me” attitude.

The Numbers

Enforcement from October 2019 through September 2020

Total citations: 1,201

Total inspections: 1,200

Total proposed penalties: \$4,056,031

Industries most often violating eye and face protection requirements:

Construction: \$4,023,139

Wholesale Trade: \$16,297

Administrative and Support and Waste Management and Remediation Services: \$7,470

Manufacturing (part 3 of 3): \$6,000

Professional, Scientific, and Technical Services: \$2,256

Manufacturing (part 2 of 3): \$869

Prevention

Thousands of people are blinded each year from work-related eye

injuries that could have been prevented with the proper selection and use of eye and face protection. Many workers are unaware of the potential hazards in their work environments, making them more vulnerable to injury.

Eye injuries can be caused by:

- Flying wood or metal chips
- Splashes with grease and oil
- Burns from steam, ultraviolet or infrared radiation exposure
- Nails
- Welding fumes
- Solvent splashes
- Glass
- Wire

OSHA requires employers to ensure the safety of all employees in the work environment. Eye and face protection must be provided whenever necessary to protect against chemical, environmental, radiological or mechanical irritants and hazards. It is designed to prevent or lessen the severity of injuries to workers. The eye protection chosen for specific work

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situations depends upon the nature and extent of the hazard, the circumstances of exposure, other protective equipment used and personal vision needs. Personal protective eyewear includes goggles, face shields, safety glasses or full-face respirators.

Eye protection should be fit to an individual or be adjustable to provide appropriate coverage. It should be comfortable and allow for sufficient peripheral vision. Employers should conduct a hazard assessment to determine the appropriate type of protective eyewear appropriate for the potential hazards of a given task.

Compliance

Among the key provisions of the eye and face protection standard:

- The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors or potentially injurious light radiation.
- The employer shall ensure that each affected employee uses eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on side shields) meeting the pertinent requirements of this section are acceptable.
- The employer shall ensure that each affected employee who wears prescription lenses while engaged in operations that involve eye hazards wears eye protection that incorporates the prescription in its design, or wears eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.
- Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.
- Protectors shall meet the following minimum requirements:
 - They shall provide adequate protection against the particular hazards for which they are designed.
 - They shall be reasonably comfortable when worn under the designated conditions.
 - They shall fit snugly and shall not unduly interfere with the movements of the wearer.
 - They shall be durable.
 - They shall be capable of being disinfected.
 - They shall be easily cleanable.
- Protective eye and face protection devices must comply with any of the following consensus standards:
 - ANSI/ISEA Z87.1-2010, Occupational and Educational Personal Eye and Face Protection Devices, incorporated by reference in § 1926.6;
 - ANSI Z87.1-2003, Occupational and Educational Personal Eye and Face Protection Devices, incorporated by reference in § 1926.6; or
 - ANSI Z87.1-1989 (R-1998), Practice for Occupational and Educational Eye and Face Protection, incorporated by reference in § 1926.6;
- Protective eye and face protection devices that the employer demonstrates are at least as effective as protective eye and face protection devices that are constructed in accordance with one of the above consensus standards will be deemed to be in compliance with the requirements of this section.
- Protection against radiant energy in welding should follow OSHA's guides for the selection of the proper shade numbers of filter lenses or plates.
- Employees whose occupation or assignment requires exposure to laser beams shall be furnished suitable laser safety goggles which will protect for the specific wavelength of the laser and be of optical density (O.D.) adequate for the energy involved. **WMHS**

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Machinery & Machine Guarding, General Industry - Regulation 29 CFR 1910.212

Ranking: 10

A Workplace Story

From a California Case Report:

A 38-year-old machine operator was strangled when his shirt got caught on a rotating knob of a printing machine. The rotating knob did not have any guarding or protective barriers around it to prevent inadvertent contact. The victim had 14 years of prior experience operating similar machines and had received one-on-one training by an experienced machine operator. Although this incident was not witnessed, the victim was probably checking the status of the ink trays while the machine was running. He was able to reach the computer screen of the machine and shut the machine off, but unable to free himself from the rotating knobs.

The investigators recommended that, in order to prevent similar incidents, when employees work near moving machinery components, printing plant employers should ensure that safety features and appropriate guards

are integral to printing machine design so that employees cannot become entangled and risk injury or death. In this instance, the printing machine was not manufactured with guards over the rotating knobs, and there was no mechanism to ensure that the knobs stopped rotating when the employee checked the ink tray status.

The Numbers

Enforcement from October 2019 through September 2020:

Total citations: 1,092

Total inspections: 994

Total proposed penalties: \$7,442,593

Most Frequently Violated OSHA Standard Ranking-Number 9

Industries most often violating machine & machine guarding requirements in general industry:

Manufacturing (part 3 of 3):

\$3,060,650 in penalties

Manufacturing (part 2 of 3): \$1,820,387

Manufacturing (part 1 of 3): \$1,094,701

Wholesale Trade: \$400,405

Retail Trade (part 1 of 2): \$315,896

Administrative and Support and Waste Management and Remediation Services: \$139,558

Other Services (except Public Administration): \$76,340

Public Administration: \$5,735

Transportation and Warehousing (2 of 2): \$137,753

Transportation and Warehousing (1 of 2): \$56,565

Prevention

Machines can help improve production efficiency in the workplace. However, their moving parts, sharp edges and hot surfaces can also cause serious workplace injuries. Employee exposure to unguarded or inadequately guarded machines is prevalent in many workplaces. Consequently, workers who operate and maintain machinery suffer approximately 18,000 amputations, lacerations, crushing injuries, abrasions and over 800 deaths per year.

Amputation is one of the most severe and crippling types of injuries in the occupational workplace, and often results in permanent

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disability. Approximately 44 % of all workplace amputations occur in the manufacturing sector and the rest occur across the construction, agriculture, wholesale and retail trade, and service industries.¹ These injuries result from the use and care of machines such as saws, presses, conveyors, and bending, rolling or shaping machines as well as from powered and non-powered hand tools, forklifts, doors, trash compactors and during materials handling activities.

Safeguards are essential to protect workers from injury. Any machine part, function or process that might cause injury should be safeguarded. When the operation of a machine may result in a contact injury to the operator or others

¹ www.osha.gov/sites/default/files/publications/osha3170.pdf

in the area, the hazard should be removed or controlled.

All machines consist of three fundamental areas: the point of operation, the power transmission device and the operating controls. Despite all machines having the same basic components, their safeguarding needs widely differ due to varying physical characteristics and operator involvement. The purpose of machine guarding is to protect the machine operator and other employees in the work area from hazards created by ingoing nip points, rotating parts, flying chips and sparks. Some examples of this are barrier guards, light curtains, two-hand operating devices, etc.

Compliance

Among the provisions of OSHA's Machinery and Machine Guarding – General Industry standard:

- Guards must not create potential hazards and must be attached to the machine where possible.
- If guards cannot be attached to the machine, attach elsewhere.
- Machines that expose an employee to injury must be guarded. The guarding device must:
- Be in conformity with any appropriate standards.
- If specific standards are not available, the machine construction should prevent the operator from having any

part of his/her body in the danger zone during the operating cycle.

- Special handtools used for placing and removing material from point of operation areas must allow easy handling of the material without the operator placing a hand in the danger zone. Such tools must not replace guards required by this section: 29 CFR 1910.212(a)(3)(iii)]
- The following machines usually require point of operation guarding:
 - Guillotine cutters
 - Shears
 - Alligator shears
 - Power presses
 - Milling machines
 - Power saws
 - Jointers
 - Portable power tools
 - Forming rolls and calenders
- Revolving barrels, containers and drums must be guarded by an enclosure interlocked with the drive mechanism, so the barrel, gun or container cannot revolve unless the guard enclosure is in place.
- When the periphery of the blades of a fan is less than seven feet above the floor or working level, the blades must be guarded. The guard must not have openings larger than one-half inch.
- A machine designed for a fixed location must be securely anchored to prevent walking or moving. **WMHS**

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5 Steps to Improve Machine Safety

So the story starts with you looking at a plant full of equipment, some new, some old, with the operators working hard to meet production requirements. If your safety sign reads: “We Have Worked 1 Day(s) with Zero Accidents”, then maybe it’s time to review and improve your plant safety program.

It’s everyone’s responsibility to work carefully and report unsafe conditions on the plant floor. In particular, personnel working around machines must be aware of and protected from hazards created by point-of-operation, pinch points, rotating machinery, flying debris and sparks.



Plant summer shutdowns and holidays are a great time for maintenance folks and engineers to plan for machine and process upgrades. Safety upgrades are appropriately sized projects to complete during these

shutdowns—but the work must be carefully identified, defined and scheduled to be successful. Another key component to success is involving operators and maintenance techs every step of the way, as they are on the front lines where hazards are most pronounced.

Safety starts with the right plant culture, which creates awareness and prioritizes safety over production. Safety can then be improved through this five-step program:

1. Review and document plant safety requirements
2. Perform a risk assessment on all machines
3. Order and install signs identifying hazards
4. Identify and install new safety components
5. Train operators on new requirements and designs

BE SAFE, IT’S REQUIRED

If your facility doesn’t have safety requirements, the first step is to create them. But in most cases, safety requirements exist and just need to be reviewed, updated and disseminated to all plant personnel. Proper plant policy, standards and requirements go a long way toward promoting vigilant workers.

ASSESS MACHINE RISK

A key to improved safety is to identify, analyze and remove hazards. From a machine safety and related electrical standpoint, there are many potentially hazardous situations such as boom, crush, zap, burn and cut. Lots of online information is available regarding risk assessment, allowing you to make a proper assessment and answer these three questions:

1. What are the hazards?
2. How can the hazard hurt personnel?
3. How can the hazard be removed or controlled?

Answering these questions for all machines in your facility will likely identify many areas for safety improvements. Make a list and start going after the low hanging fruit, and continue until the tree is picked clean.



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www.sustainableplant.com

I SEE SAFETY

With a safety mindset in place, it is important to identify specific hazards with signage. Not only do signs remind workers to think about safety every day, they also point out hazards that may go unnoticed. Whether it's chemical, electrical, personal protection, personal awareness or machine safety—all hazards must be identified.

OSHA and ANSI Z535-2011 standards exist to present safety and accident prevention information. There are hundreds if not thousands of signs available for purchase, but don't go crazy as too much of a good thing will overwhelm operators and maintenance techs.

REVIEW DESIGNS, INSTALL COMPONENTS

The risk assessment will likely show that some machines have had safety systems modified, adjusted, bypassed, disabled or removed.

It will also probably show areas requiring installation of new safety components. In both cases, the safety systems must be brought up to date, either by restoring original designs, or by adding new components.

Typical safety design and maintenance improvements projects include:

- Improve point-of-access control using a light curtain
- Install two-hand control on assembly equipment
- Upgrade poorly designed guarding
- Replace troublesome guard safety switches

- Improve guard mechanical design and safe-state monitoring
- Add emergency stop pushbuttons

Remember, some safety systems are disabled by operators because they are poorly designed, and in these cases it's better to improve upon the design instead of just restoring the machine to its original state.



courtesy of [Safetyposter.com](https://www.safetyposter.com)

TRAIN OPERATORS

Because the plant operators and maintenance techs were involved from the get go, training on the new safety regime should primarily consist of review. It's imperative to make sure everyone in the plant is on board and fully aware of all changes and upgrades, as even the best designed facilities can become unsafe with untrained or careless workers. Emergency response training should also be included in these review sessions.

Whether it's a new corporate push for safety or simply a continuation of existing practices, actively identifying areas to improve safety and implementing corrective measures is a never-ending yet necessary process.

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