

# Complete Fall Protection Solutions

Complex Worksites. Simplified Solutions.

COMPLETE FALL  
PROTECTION SOLUTIONS

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## EXECUTIVE SUMMARY

# FALL PROTECTION

### Working to Prevent Worksite Accidents and Fatalities

**E**ach year, Fall Protection ranks as one of the most common workplace safety violations throughout the United States and Canada. In fact, falls are the leading cause of worker fatalities in the construction industry, which has prompted the agency as well as worksites throughout the country to focus ever more diligently on preventing falls.

Outfitting workers with the proper fall protection equipment is a step in the right direction. Having equipment that is suitable for the environment is also a crucial element in keeping workers protected. Materials in personal protection equipment have to be tailored to the specific climate and situation the workers are operating in.

Training is also key. Safety leaders need to instill in their employees the necessity of situational awareness—developing almost a sixth sense of knowing where and when accidents could happen, and knowing how to avoid and prevent them.

In this special eBook guide to fall protection and prevention, we'll look at some of the measures EHS managers can take to promote workplace safety. We'll also look at how to train your employees for a rapid response in case a fall accident does occur, and the four types of rescue and the equipment needed in each case. You'll learn about the "leading edge" standards in fall protection equipment, and the importance of the materials used in this equipment. And we'll update you on the latest resources from OSHA on fall protection to ensure your worksite is as safe as possible.

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# WAYS TO IMPROVE CONSTRUCTION SITE SAFETY

In 2017, out of 4,674 worker fatalities in private industry, one in five were in construction.



**T**he term “time is money” is quite literal in the construction industry. The constant pressure project managers and crews face to meet deadlines and stay within budget often causes safety to fall to the wayside. In 2017, out of 4,674 worker fatalities in private industry, one in five were in construction. Implementing each of these strategies can help improve health and safety in construction on any job site:

## SET SAFETY EXPECTATIONS

OSHA’s Safety and Health Regulations for Construction: OSHA 29 CFR 1926 serves as a baseline for safety requirements. Safety management in construction must reinforce

these regulations and go beyond by continuously leading by example and making safety a priority before work begins. By setting clear expectations for safety from the beginning, managers can set the tone to ensure each worker understands their personal responsibility for safety. This will help everyone work together toward the common goal of preventing injuries.

As a safety manager, it’s important to “walk the talk” when it comes to workplace safety and health. “The example you set, and the way you talk to workers about safety, has a huge impact on the company’s safety and health program, safety culture, and ability to reduce injury and illness,” according to OSHA. When workers are able to recognize the value management has for their well-being, it helps build trust.

Some workers may never interact with senior management. It’s found that these employees are more likely to value and internalize safety messages when they are occasionally delivered by higher-level management rather than passed down in the chain of command. Make it clear that it is everyone’s responsibility to follow rules, procedures, and best practices to prevent accidents on the job site. Incorporate safety language into policies and procedures so it becomes ingrained as a natural part of a worker’s daily routine.

An informal safety talk at the start of each work day can make safety managers’ jobs easier by improving worker

understanding of safety expectations, preventing wasted time on inconsistencies, and minimizing chances of error. Toolbox talks continue to be the most effective means of communicating safety to workers. It sparks valuable discussion on general safety and information about safer tools, equipment, materials, and processes.

Utilize OSHA’s website for a variety of topics from emergency planning, tool and equipment safety, ladder safety, personal protective equipment and more to help create or obtain a presentation. Always make sure the content is relevant to your specific work site and feature engaging elements like visuals and anecdotes that workers can connect with.

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## PROMOTE A NONTHREATENING ENVIRONMENT

The authors of Crucial Conversations conducted a survey of 1,500 workers in 22 organizations and found 93% of employees say their workgroup is currently at risk from a safety issue that is not being discussed. In addition, almost half knew of an injury that occurred because someone didn't speak up. Trust and quality of relationships heavily influence the safety and overall productivity of workers.

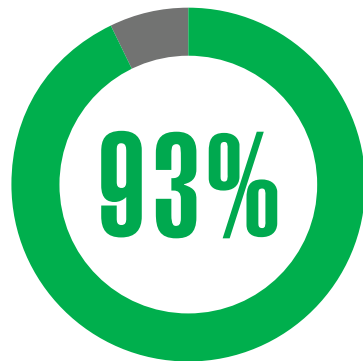
Always encourage employees to speak up when they see something going wrong; this can significantly help to avoid incidents, injuries, and fatalities. To increase chances of participation, ensure workers feel comfortable to ask questions and raise safety concerns without fear of retaliation or bullying. This will make it easier and quicker to address issues head on to prevent them down the road.

OSHA finds that managers often avoid giving feedback to prevent confrontations. If improvements to a worker's performance can be made, approach them in a constructive, positive way. Make sure to avoid judgmental statements and criticisms and focus on the behavior itself, not the person and their values or personality.

## PLAN AHEAD

Ensure all prework activities, such as approvals, are completed before work begins. A thoughtful planning process can help the work day start on a more efficient and safe foot. Implement zoning to block off areas where certain tasks will take place, install nets and catch platforms, and apply any other safety measures.

Stage and stock each work area with the necessary tools, PPE, and equipment before the workday begins. This will make it easier and safer for workers to access what they need. Make sure to supply the right tools for the right tasks, and double check that workers understand how to properly operate the equipment they'll be using. Eliminate hazardous distractions and obstructions by reinforcing consistent housekeeping practices on the job site.



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## TAKE ADVANTAGE OF TECHNOLOGIES

Provide new opportunities to address safety challenges and experience immediate cost savings. Technology can be worth the investment to help bridge time and distance constraints, improving efficiency and safety in the long term.

The growth of digitization in construction now makes it possible to make real-time decisions remotely. Unmanned aerial vehicles (UAVs), known as drones, are already in use in the industry and provide a convenient way to conduct site inspections, observations, and safety audits. Managers can use smartphones, tablets, and project management software to share project data instantaneously from remote work sites and to workers and other onsite supervisors using a cell phone or tablet. Allowing everyone to have immediate access to the same information eliminates costs of equipment that must be updated and maintained, and it keeps everyone consistently on the same page.

A recent report by Dodge Data & Analytics found that 82% of contractors who use wearable technology see instant site-safety improvements. Wearable devices like smart watches, glasses, and clothing allow managers to have better visibility of the work site and workers. These devices have the ability to alert managers to activities going on in the field and even improve response time when injuries occur, like the ability to detect when an employee slips, trips, and falls, triggering an automatic alert to designated site personnel, including medics. These devices also keep track of locations of workers and procedures on the job site. Trigger alarms exist to streamline evacuation procedures in the event of an emergency. These capabilities offer immediate safety benefits. There are also a number of free iOS applications that exist to promote hazard prevention efforts.

## EASY TO IMPLEMENT SAFETY SOLUTIONS

One of the most important parts of safety on a construction site is clear and effective communication at all times. An easy way employers can communicate with workers in different areas on a job site is through safety signs and labels. Comply with OSHA and ANSI standards and reinforce safety anywhere on the work site with easy to install pre-made construction labels and signs. For on-demand custom, site-specific procedures and instructions, DuraLabel printers and supplies are a reliable safety communication solution. All supplies are built to last in the harsh conditions that exist in the construction industry.

Thoughtfully implementing each of these strategies will help to prevent downtime, chances of injury, and improve overall safety on a construction site. ●





# HOW LEADING EDGE STANDARDS AFFECT YOUR CHOICE OF FALL PROTECTION EQUIPMENT



It's crucial that employees have equipment to help protect against serious injury and death when working at heights. Fall protection is a vital part of construction, industrial maintenance, and related fields and industries.

Even though providing fall protection equipment is required by OSHA regs, as a safety professional, your commitment goes deeper than just compliance. You want your team members to go home each night to their families.

Here are some sobering statistics for the construction industry.

In 2016, OSHA (the Occupational Safety and Health Administration) reported that out of 4,693 deaths in private industry, 991 or *over 21%* were in construction. In other words ... one in five worker fatalities.

Of those 991 construction fatalities, 384 or *over a third of them* were the result of falls. What's even more disturbing is that of the top 10 most frequently cited OSHA standards violated in 2017, *fall protection in construction continues to be number one*. We need to improve those statistics.

One of the most talked about topics in fall protection is the "leading edge" concept and it's been the subject of regulatory and standards organizations for the past several years.

In this article, we'll discuss:

- How "leading edge" is defined by OSHA
- How it affects the design of fall protection equipment
- What to look for when choosing SRLs (self-retracting lanyards) for leading edge applications

At the end, I'd like to relate an interesting historical anecdote related to the hidden benefits of fall protection. You can use it as a talking point with your workforce and it's a good topic to discuss with the stakeholders who hold the purse strings to your safety equipment budget.

## HOW LEADING EDGES ARE DEFINED

A leading edge is any unprotected edge of a platform, floor, or other construction point where the elevation between the next level or the ground is greater than six feet.

Here's how OSHA defines it. In its official publication, *Fall Protection in Construction* ([OSHA 3146-05R 2015](#)), OSHA states:

**Leading edge:** The edge of a floor, roof, or formwork for a floor or other walking or working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.



An example is when installing metal decking for flooring in a multi-story building.

A guardrail system would be an ideal solution for leading edge applications. But it's not always feasible. Some form of personal fall arrest system must also be used.

So, let's put this in real life terms. For work above 6 feet, construction workers and others know that fall protection is necessary. And most of the time, a worker can tie off to an anchor point above the D-ring on the harness.

However, leading edge work is different in several ways. First, there's the edge itself. Often, it's at the open side or edge of a building where the workers are laying decking, or performing other flooring or roofing tasks. In many cases, that edge is sharp, with either a very small radius or a 90 degree sharp angle. Should a crew member fall, the lifeline will come in contact with that edge. It's often the sharp edge that could cut or fray the cable or webbing, particularly on impact. But, it's also likely that the worker might sway back and forth while dangling over the edge.

Unless the worker falls directly in line with the anchor point, this pendulum style movement will naturally occur. That back and forth movement can quickly sever a lifeline cable or webbing that's not designed for it.

The other potential hazard is the anchor point itself. The anchorage is usually below D-ring level, often at foot level. Low anchorage is necessary because there's not always an overhead, approved attachment point, such as a wall or ceiling joist, and the lower anchor point doesn't interfere with a worker's arm movement. However, this means that the worker could fall farther before the deceleration device on the SRL or PFL catches. The lifeline might not reach the necessary speed to engage quickly enough to prevent *some* dangerous fall distances.

A basic personal fall arrest system consists of an anchorage point, connectors, and a body harness. (By the way, don't even consider a body belt. They've been banned for fall arrest since January 1, 1998.)

Complete systems include a lanyard, deceleration device, and a lifeline. Some use PFLs (personal fall limiters), while other employ SRLs (self-retraction lifelines).

PFLs are limited to eight feet or less in length. SRLs allow for far greater range of

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REQUIRE SPECIALLY  
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PROTECTION  
EQUIPMENT.”**



movement, reaching as up to 20 feet or more. SRLs or PFLs may provide a safety option for leading edge operations. The anchor point in leading edge applications sits below the D-ring attachment on the harness, often at foot level. But, it's the leading edge/sharp edge hazards that ultimately affect the design of leading edge fall protection equipment.

### HOW LEADING EDGES AFFECT FALL PROTECTION DESIGN

ANSI (the American National Standards Institute) has even tougher standards and pays particular attention to lifeline performance in leading edge/sharp edge applications.

As mentioned above, a sharp edge is any non-rounded edge that can potentially cut, fray, or completely sever a lifeline or lanyard. The ANSI standard for testing the fall arrest device's lanyard is dropping it over a steel bar with a radius of .005 inches or







less. If there's any severe damage or a complete separation at the point of impact, the device fails and it's deemed noncompliant for a leading edge application.

The SRL must meet the conditions for dynamic performance, dynamic strength, and static strength as outlined in ANSI Z359. But, it must also pass the sharp edge test standard for leading edge approval.

By the way, only SRLs that pass the sharp edge requirements are permitted to include the LE designation on their label. So, be sure that it's labeled "SRL LE."

### WHAT TO LOOK FOR IN LEADING EDGE PERMITTED SRLS

The device must carry the SRL LE designation for use in leading edge/sharp edge work. But here are some other options to consider.

According to OSHA standards, every SRL (whether for leading edge or not) must be inspected prior to each use. Some devices come with a clear outer casing that let you

visually check the cable, retraction dampening controls, and other internal components.

Any fall limiting device that is subjected to an incident must be taken out of service immediately, but you can put the device back into service quickly if internal components, cabling, and user-side shock absorber can be replaced onsite. This is a time saver if available.

By design, most SRLs are flat, disc-shaped mechanisms. Look for devices that include an integrated roll cage. This increases the life of the SRL LE by lessening damage caused by scraping along hard surfaces.

One final note:

**"NON-LEADING EDGE DESIGNATED PFLS AND SRLS CANNOT BE USED FOR LEADING EDGE OR SHARP EDGE WORK. BUT THE REVERSE IS NOT NECESSARILY TRUE. FALL ARREST DEVICES RATED SRL LE CAN OFTEN BE USED IN OTHER APPLICATIONS."**

You can save money by purchasing an SRL LE certified for other tasks as well.

Now... here's that historical anecdote I mentioned.

### THE HIDDEN BENEFIT OF EFFECTIVE FALL PROTECTION

The year was 1933. The high-steel project? None other than the 1.2-mile-long Golden Gate Bridge, set to span the Golden Gate Straight where the San Francisco Bay emptied into the Pacific Ocean.

The problem? In those days, the number of fatalities *expected* was one man for every \$1M of construction cost. The bridge was expected to cost well over \$36M. For the lead engineer, Joseph Baermann Strauss, this loss of life was unacceptable. Along with other safety innovations—hard hats, wind goggles, and respirators, to name a few—he installed a unique, lifesaving form of fall protection.

A safety net was strung from one end of the bridge to the other. It was installed as each span was added. Once the net was in place, workers worked more quickly and efficiently, the fear of drowning all but eliminated. Nineteen men fell into the net, but they were saved from drowning in the ice waters of the Bay.

*The result?* The bridge was constructed \$1.3M below budget... and months ahead of schedule. Fall protection can save lives, and that's vital. But it can save time and money as well.

In a very real way, money spent on fall protection gear is not just a purchase... *it's an investment for—and in—everyone involved.* ●





# SEVEN MILLION WAYS TO PREVENT INJURIES

OSHA's new take on the Walking-Working Surfaces and Fall Protection standard is causing companies in general industry to re-evaluate safety plans for slip, trip and fall prevention.



**D**ecades after OSHA first held a public meeting regarding revisions to its Walking-Working Surfaces standard for general industry, the final rule will become effective on Jan. 17, 2017.

The revision to *29 CFR Part 1910* general industry addresses *subpart D* – for slip, trip and fall hazards and *subpart I* – adding requirements for personal fall protection systems. In addition, it eliminates the existing mandate to use guardrails as a primary fall protection method and allows employers to choose from accepted fall protection systems, according to OSHA.

“The final rule will increase workplace protection from those hazards, especially fall hazards, which are a leading cause of worker deaths and injuries,” Assistant Secretary of Labor for Occupational Safety and Health Dr. David Michaels previously said to the press. “OSHA believes advances in technology and greater flexibility will reduce worker deaths and injuries from falls.”

OSHA estimates the new standard will prevent 29 fatalities and more than 5,842 injuries annually. The rule will affect about 112 million workers at 7 million worksites.

To say the final rule is long-anticipated is an understatement. *Subparts D* and *I* originally were appended to *29 CFE Part 1910* in 1971. After a series of informal public meetings and extensive research was conducted, the agency published a first round of proposals to revise the subparts in April 1990 and again sought feedback in 2003 and 2010. It wasn't until November 2016 that the final rule was released.

As proposed rules have been introduced throughout the years, employers and safety managers already have steadily integrated personal fall protection that meets or exceeds the new standard, meaning it will have minimal-to-no impact on those operations. However, others are still evaluating how they will revise their current safety plans to accommodate the changes.

## ADAPTING TO CHANGE

OSHA's fall protection requirements for general industry now will fall in more closely with construction standards, accommodating outdated scaffolding standards and allowing companies to select the best personal protective equipment for their specific situation. For some safety managers, this means business as usual, but for others, equipment updates and training will need to be evaluated.

Joann DeLao, safety manager at Hunter Site Services, an America's Safest Company, anticipates no change to the company's program with the new rule.

“Hunter Site Services already has an extensive fall protection program utilizing personal fall protection – 100 percent tie off and 100 percent ladder tie offs,” she says.



OSHA ESTIMATES  
THE NEW  
STANDARD  
WILL PREVENT  
**29**  
FATALITIES  
AND MORE THAN  
**5,842**  
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ANNUALLY.





As far as equipment upgrades, the company already had been looking to a ladder safety system prior to the new rule being released, she said. In addition, in-house training and hazard recognition already were part of the company's safety plans.

In the Southwest, despite more favorable weather conditions, slips, trips and falls still are an integral part of safety plans.

Nathan Cashion, safety supervisor, South Texas Project Nuclear Operating Co. (STPNOC), an America's Safest Company, is in the gap analysis phase to determine how much the company will need to revise its hazard recognition and injury prevention methods to comply with *subparts D and I*.

Cashion notes five prevention methods in STPNOC's latest safety plan that are employed to reduce same-level slips, trips and falls at the company:

1. Situational awareness.
  - » Keep travel paths, walkways and stairs clear of parts and materials.
  - » Elevate or cover hoses, cords and leads to eliminate tripping hazards.
  - » Prior to using a harness, lanyards and safety lines, the user shall perform an inspection for signs of cuts, fraying, in-service loading or other damage that may cause failure during use.
2. Placement of signage when slip hazard is present.
3. Anti-skid material in known slip areas.
4. Housekeeping efforts.
5. Floor coatings in the turbine and reactor containment building.

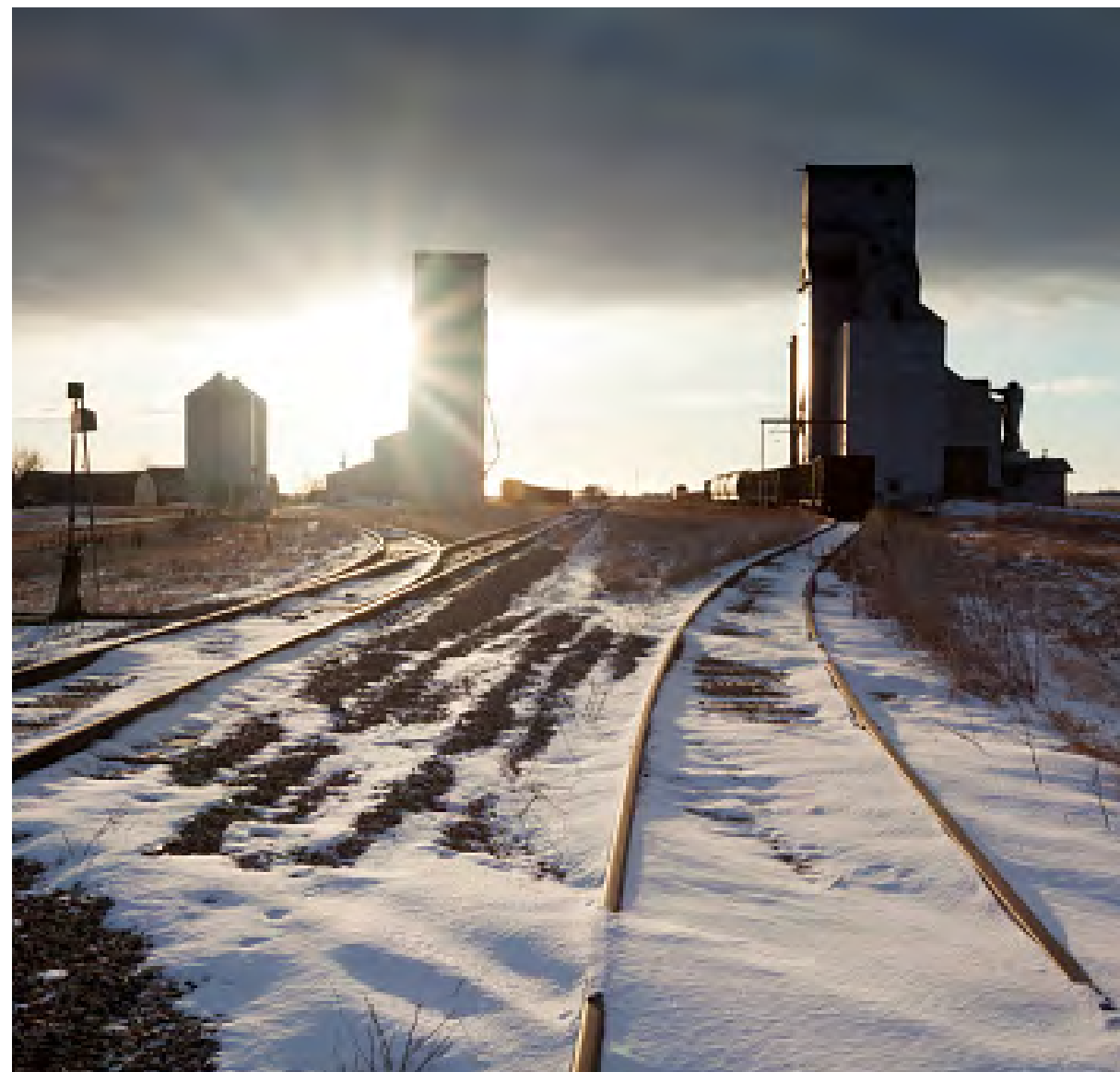
Other companies such as South Dakota Wheat Growers (SDWG), another America's Safest Company, progressively will incorporate equipment and training into their safety plans as OSHA's timeline dictates.

"The new standards will have some effect on our company as new equipment is added or replaced in the future," says Tom Waletich, EHS specialist, SDWG.



**"OUR CURRENT WINTER WEATHER CONDITIONS BRING US MANY SLIP HAZARDS, AND OUR EMPLOYEES ARE PREPARED THROUGH ONGOING SAFETY COMMUNICATIONS (TWO-MINUTE SAFETY TALKS), ADDITIONAL FOOTWEAR PROTECTION AND THE USE OF ICE-MELT IN TRAFFIC AREAS."**

— Tom Waletich, EHS specialist, SDWG.



Because the company operates in the Midwest, the hazards associated with slips and falls are a constant battle, especially in the winter months, he says.

Currently, all employees receive training on the hazards of slip, trip and falls prior to beginning work and on an annual basis going forward. Facilities are prepared through regular inspections of work areas and housekeeping in any areas where work traffic is identified.

"Our current winter weather conditions bring us many slip hazards, and our employees are prepared through ongoing safety communications (two-minute safety talks), additional footwear protection and the use of ice-melt in traffic areas," Waletich says. "Our company also incorporates a behavioral based safety program in which employees observe each other completing tasks and communicate positive feedback to enhance safety awareness which includes slip, trip and fall hazards." ●





# OSHA PROMOTES FALL PROTECTION RESOURCES

Fall hazards continue to be problematic in the safety industry.

With falls leading OSHA's top 10 list of violations year after year, the agency is bolstering its efforts to increase awareness about its fall prevention resources.

The agency has developed a collection of compliance assistance resources to address falls in the workplace, the leading cause of worker fatality in the construction industry. These resources, which continue the goals of the Department's Office of Compliance Initiatives (OCI), encourage and facilitate compliance evaluations.

Falls can be prevented if employers plan ahead to ensure the job is done safely; provide the right equipment; and train workers to use the equipment safely. OSHA is working with industry stakeholders to provide informative compliance assistance resources.

The sixth annual [National Safety Stand-Down to Prevent Falls in Construction](#) will be held May 6-10, 2019. The week-long outreach event encourages employers and workers to pause during the workday to discuss fall hazards and how to prevent them.

In addition, OSHA's [series of fall safety videos](#) show how to prevent construction-related fall hazards from floor openings, skylights, fixed scaffolds, bridge decking, reroofing and leading edge work.

Another resource is the agency's [fall prevention training guide](#), which provides a lesson plan for employers including several toolbox talks. Fact sheets on [ladders](#) and [scaffolding](#) provide guidance on the safe use of these types of equipment while performing construction activities.

A brief video, [5 Ways to Prevent Workplace Falls](#), encourages employers to develop a fall prevention plan, and to provide workers with fall protection and training.

Lastly, OSHA's [on-site consultation program](#) provides valuable services for job creators that are separate from enforcement. OSHA recently published an analysis demonstrating how the agency's on-site consultation program contributes \$1.3 billion to the national economy each year. Job creators who implement workplace improvements can reduce lost time due to injuries and illnesses, improve employee morale, increase productivity, and lower workers' compensation insurance premiums. ●



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# TOP 10 MOST FREQUENTLY CITED OSHA STANDARDS



## Can you see all of them?

Every year OSHA publishes the top list of 10 most frequently cited standards so that employers can take steps to find and fix recognized hazards. Far too many preventable injuries and illnesses occur in the workplace. Use this guide to evaluate your worksite to be proactive and focus on prevention.



**1**  
**FALL PROTECTION, CONSTRUCTION**  
**29 CFR 1926.501**  
Employers have a duty to have fall protection.

**3**  
**SCAFFOLDING, GENERAL REQUIREMENTS, CONSTRUCTION**  
**29 CFR 1926.451**  
Scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

**2**  
**HAZARD COMMUNICATION STANDARD, GENERAL INDUSTRY**  
**29 CFR 1910.1200**  
The hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees.

**4**  
**RESPIRATORY PROTECTION, GENERAL INDUSTRY**  
**29 CFR 1910.134**  
A respirator shall be provided to each employee when such equipment is necessary to protect the health of such employee.

**5**  
**CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT), GENERAL INDUSTRY**  
**29 CFR 1910.147**  
Minimum performance requirements for the control of such hazardous energy that may occur while servicing and maintaining of machines and equipment in which the unexpected energization or start-up of the machines or equipment, or release of stored energy, could harm employees.

**6**  
**LADDERS, CONSTRUCTION**  
**29 CFR 1926.1053**  
Requirements for all ladders as indicated, including job-made ladders.

**7**  
**POWERED INDUSTRIAL TRUCKS, GENERAL INDUSTRY**  
**29 CFR 1910.178**  
Safety requirements relating to fire protection, design, maintenance, and use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines.

**8**  
**FALL PROTECTION TRAINING REQUIREMENTS**  
**29 CFR 1926.503**  
The employer shall provide a training program for each employee who might be exposed to fall hazards.

**9**  
**MACHINERY & MACHINE GUARDING, GENERAL REQUIREMENTS**  
**29 CFR 1910.212**  
One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks.

**10**  
**EYE AND FACE PROTECTION**  
**29 CFR 1926.102**  
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.

## ARE YOU OSHA COMPLIANT?

Far too many preventable injuries and illnesses occur in the workplace. Visit [MSAsafety.com](https://www.msasafety.com) for products and solutions to help identify and reduce these risks and hazards.

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WHAT'S AT STAKE.

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# RAPID READINESS FALL RESCUE: 6 MINUTES TO TRAUMA



Imagine this hypothetical employee named “Bob”. Bob’s an excellent worker. He knows what he’s doing, and his boss knows he can count on him to get the job done and done right.

We’d all like to hire Bob, right?

There’s another reason Bob’s one of the best team members anyone could ask for... he *always* uses his safety equipment. He knows how vital PPE (personal protective

equipment) is for performing each job safely, without injury.

But... accidents do happen unexpectedly.

*That’s why they call them accidents, right?*

And while using the proper PPE helps reduce the impact of accidents, there are additional action steps to take when falls from heights are involved.

You already know that working at heights presents some unique hazards. That’s why you insist that your workers use full-body harnesses and the appropriate fall-arrest system.

You’ve trained them how to inspect and don them properly, realizing that a proper fit is crucial to their effectiveness. You’ve shown them how to assess anchor points and attach to them correctly.

*But... the training can’t stop there.*

You must also teach them about orthostatic intolerance, also called suspension trauma, and how it affects the body.

They must understand that a rapid response to a fall accident is critical to protecting a worker from further injury, and possibly death.

Here’s why.

## WHAT ARE ORTHOSTATIC INTOLERANCE AND SUSPENSION TRAUMA?

You’ve probably experienced orthostatic intolerance (OI) yourself. It can happen without a hazardous work environment, and without you realizing what’s going on.

Here’s an abbreviated description. Anytime you stand or sit for an extended period with little or no leg movement, OI is possible. It can be the reason people faint after standing a long time without moving.

*(More than one bridesmaid or best man has toppled over during a long wedding.)*

It can happen if you sit for a long time as well, perhaps at your work desk or in your easy chair while binge-watching your favorite TV show.

You stand up quickly, and get a little light-headed or dizzy. It takes a few seconds to get your balance. It’s kind of a strange feeling, but passes fairly quickly.

That’s orthostatic intolerance... on a small scale.



## WHY AND HOW DOES THAT HAPPEN, ANYWAY?

In the safety and health bulletin, *Suspension Trauma/Orthostatic Intolerance* – a joint paper from the U.S. DOL and OSHA (SHIB 03-24-2007, updated 2011) – the causes and symptoms of OI and suspension trauma are explained. The paper also outlines potential hazards and recommendations to prevent permanent injury.

It's all about the body's circulatory system. We understand the main components: the heart (the two-stage pump), the arteries and veins (the supply and return piping), and the blood (the fluid).

Your heart pumps oxygen-enriched blood into the arteries. It flows throughout the system, feeding your organs and other body parts. The oxygen-depleted blood flows

back to the heart through the veins, drawn through the superior vena cava (main vein) by the right ventricle (the intake pump and valve).

Interestingly, the circulatory system in an adult is approximately 60,000 miles long. Blood completes the circuit in about 20 seconds! Obviously, the heart must have some help moving all that fluid around the body.

It does... and leg muscles are one of the "auxiliary pumps." When you move them, it helps push your blood along the circulatory system more efficiently.

That's the reason you feel dizzy or disoriented when you stand up quickly. Your brain and other organs are slightly starved of oxygen because the lack of leg movement caused blood to collect in your legs, a condition called venous pooling.

Now, imagine that you are suspended in a harness after a fall. The potential for venous pooling is increased and prolonged. That can lead to:

- Dizziness
- Weakness
- Sweating
- Fainting
- Increased heart rate

To find out more about how your heart works, check out this [article from WebMD](#).

If the worker is suspended for an extended period of time, orthostatic intolerance — suspension trauma — can set in. According to a joint paper from the U.S. Department of Labor and OSHA (SHIB 03-24-2004, updated 2011):

Prolonged suspension from fall arrest systems can cause orthostatic intolerance, which, in turn, can result in serious physical injury, or potentially, death. Research indicates that suspension in a fall arrest device can result in unconsciousness, followed by death, in less than 30 minutes.

That's why your employees' training must include more than preventing a fall and using a fall protection system. It must also include an *emergency response plan* for recovering a coworker in the event of a fall.

*And recover them quickly.*





## PREPARATION AND THE 4 TYPES OF RESCUE

Preparing for a potential fall accident should be an important part of your overall safety program and training. Because of the health and life hazards, emergency medical preparations must be considered.

You may need medical staff onsite. Or, as an alternative, trained responders for first-aid and CPR. It would be best to have an attendant monitoring the worker (a requirement when doing any permit-required confined space tasks).

Additionally, understand the four types of rescue, and the equipment involved in each one.

1. Self-rescue
2. Assisted rescue
3. Mechanically aided rescue
4. Pick-off rescue

The first scenario is a **self-rescue**. In this instance, the fallen worker is conscious and able to perform the rescue unassisted. However, there must be equipment within reach that the worker can use. This can include:

- A fixed ladder in close proximity to the worker
- A fixed, vertical lifeline, or
- An [integrated self-rescue harness](#)

With these options available, the worker makes a controlled, smooth descent.

In an **assisted rescue**, the fallen worker is aware and able to contribute to the process. A portable rescue ladder can be used. In some instances, a mechanical winch, operated by another team member, can hoist the fallen worker to safety.

For a worker that's conscious, but unable to assist (possibly injured), you may need to perform a **mechanically aided rescue**. An aerial lift with a basket is often used.

An incapacitated or unconscious worker can't contribute to the rescue at all. In this case, a **pick-off rescue** is used. Other team members must perform the descent operations, and immediately render any necessary medical attention.

This isn't time for spur-of-the-moment or snap decisions. Proper planning *before* an accident occurs is essential for a successful rescue.

*But... there is also a way to lessen the effect of venous pooling during suspension.*



## “STEPS” TO RELIEVE SUSPENSION TRAUMA

Remember Bob, the top-notch employee who always wore his PPE, including fall protection harness and lanyard?

Well, Bob did fall, but his descent was stopped by his equipment. Now there are only six minutes to get to him and perform the rescue.

*What happens during that time?*

As Bob is suspended in midair, the leg straps on his harness pinch his arteries and veins, applying a tourniquet-like grip. But, if he can just move his legs, the pumping action will assist in getting his blood circulating again, slowing down the effects of venous pooling and suspension trauma.

*How can he do that with nothing to stand on, though?*

The addition of one, simple and easy to use device to his harness will allow Bob to pump his legs and help to prevent suspension trauma. Harness leg straps let Bob hook his feet into a ladder-like webbing that relieves the stress on his legs and blood vessels.

The device is available as an add-on feature that attaches easily to almost any harness. It's positioned to be out of the way during work tasks, but easily deployed in a fall accident.

Some newer fall protection harnesses — such as our own [V-FLEX™ Full-Body Harness](#) — have the suspension safety straps integrated permanently on the harness.

They're easy to use and, more importantly, always with the worker.

## FINAL THOUGHTS

Our imaginary worker, Bob, is safely on the ground now. He's a little shook up, but he'll survive... with all his body parts intact. The scant minutes between the initial fall and his rescue seemed like an *eternity* to him.

But thankfully, his employer had an excellent *rapid response plan*... and the equipment in place to perform a quick, safe rescue.

*Want to learn more about preparing for rapid response fall rescues?*

Be sure to check out OSHA regulation 29 CFR 1926.502(d)(20) and ANSI Z359.2-2007 to understand your required role in preventing injuries from a fall.

You can get more information about rapid response by downloading our free special report, “Rapid Rescue Readiness: What to do after a fall.”

We're here to help keep your team safe — *before and after a fall* — because just like you... *We Know What's At Stake.* ●





# WHY FALL PROTECTION MATERIALS MATTER



**F**all protection equipment needs to work. Right away. When manufacturers select quality materials that are right for the job, the equipment is more likely to work the way it's supposed to, while offering an increased service life of the product.

When you're working at the mercy of Mother Nature, you're going to want your equipment to have been designed to better hold up against everything from the sun's UV rays to ice and snow.

As part of product design, it's important that a manufacturer considers what components are suitable for prolonged exposure to environmental elements. (For example, in dusty, wet, or corrosive conditions, marine-grade 316 stainless steel and bronze are materials that can and should be used in self-retracting devices.) Regardless of location, materials in personal protection equipment (PPE) need to be tailored to their environment.

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How can you feel confident the materials you use are the right match for your worksite? Select equipment that was purpose-built and tested to perform in the conditions where you'll find yourself working. More so, determine if your equipment is the right "fit" for the type of work you perform—so you'll actually want to use it.

### MATERIALS AND INNOVATION

You have plenty of options when it comes to PPE. The safest PPE in the world will do little, however, if workers refuse to wear it because it's cumbersome, uncomfortable, or inconvenient. Enter radial energy absorption, an innovative technology new to the fall protection stage. Radial energy absorption is not a new technology, but its recent application in fall protection is new, essentially transforming energy absorption in PPE. The result? Precisely-engineered systems designed with safety in mind.

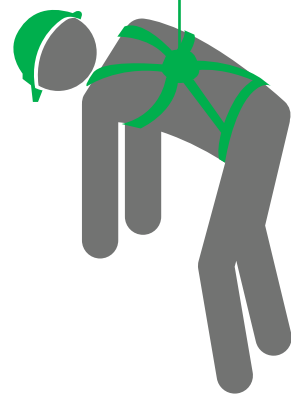
The radial energy absorber reduces the speed of a fall by causing friction between two rotating elements, meaning when a fall occurs—the user is brought to a gradual halt.

The benefit of this cost-effective solution is that it reduces the size of the energy absorber required within the product, offering a compact and comfortable solution to those wearing PPE at height.

### HOW THE COMPONENTS WORK TOGETHER

The stainless steel tolerance ring, which makes this whole process possible, is a pre-engineered integral energy absorber with pre-formed ridges around its circumference. These ridges create consistent friction and calibration. If a worker falls, the lifeline accelerates, leading the brake pawls to extend and lock against the chassis. Both the brake pawl holder and tolerance ring are stationary when locked, and the drum and bronze

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inner continue rotating under the tolerance ring's resistance. Ultimately, the energy released is absorbed and reduces the output to less than the acceptable maximum arrest force of 6kN.

This energy absorption technology incorporated into the personal fall limiter (PFL) eliminates the need for an externally housed absorber, meaning that, in the event of a fall, you are protected by a product in the smallest-possible package. And small is a big deal. Bulky, cumbersome PPE makes doing your job harder and more time-consuming, but if you work without it, you put yourself in danger and risk safety violations. This product is easily transported, allowing workers to fit into smaller spaces and offering freedom of movement. It also weighs less, increasing comfort and making workers more likely to use their PPE—ultimately improving peace of mind for everyone on the job.

### WHAT'S ON THE OUTSIDE...

...protects what's on the inside. And what's on the inside is worth protecting. When you have technology as innovative as the radial energy absorber, you want to keep them protected from external contaminants by the best possible materials.

The casing is exceptionally durable, protecting the components inside, reducing wear and damage, and offering low cost of ownership. As such, these products are appropriate for workers at height in the majority of environments because the energy absorber is sealed from the elements and external contaminants.

Some of the PFLs containing radial energy absorption technology employ transparent, polycarbonate casing that gives workers a constant view of the technology inside. As such, visual inspection of the internal componentry is easy—and able to be completed onsite.

### WHAT TO LOOK FOR IN FALL PROTECTION EQUIPMENT MATERIALS

When working at a height, you never want to compromise quality when it comes to the materials in your PPE. Look for PPE made of materials that:

- Meet strict design scope criteria
- Function as intended to arrest a fall
- Resist corrosion and wear in even the harshest conditions
- Meet the strictest safety, function, durability, and usability criteria

**LEARN MORE ABOUT MSA'S UNIQUE RADIAL ENERGY  
ABSORPTION FALL PROTECTION PRODUCTS HERE.**





# The New V-SERIES™ Harness Line from MSA.

## Unexpected Comfort.

Because the safest fall protection harness is the one you'll actually want to wear, each V-SERIES harness includes unique features to deliver exceptional comfort – so you can focus on your work, not your harness.

**Try it for yourself...**

visit [MSAsafety.com/vseriesfallprotection](https://MSAsafety.com/vseriesfallprotection)

## WE KNOW WHAT'S AT STAKE.



## RESOURCES

### [Fall Protection for Your Building](#)

Use our interactive model to demonstrate the application of MSA's fall protection solutions for building maintenance.

### [Calculating Fall Distance \(white paper\)](#)

Protect yourself and your team members against injury or death from falls. Always calculate the extremely important Total Fall Distance equation.

### [Nexus Climbing Helmet](#)

Nexus Climbing hard hats built with modern designs and mobility to withstand the needs of your industrial site.

### [V-SERIES™ Harness Line Video](#)

Because the safest fall protection harness is the one you'll actually want to wear, each V-SERIES harness includes unique features to deliver exceptional comfort – so you can focus on your work, not your harness.

### [Safety Evaluation](#)

MSA can support you with an on-site safety equipment evaluation—at no cost and zero strings attached.

### [MSA's Corporate Blog, Spotlight on Safety](#)

MSA puts a Spotlight on Safety! Check out our industrial blog dedicated to helping keep people and places safe. Explore now at [blog.msasafety.com](https://blog.msasafety.com) #SpotlightOnSafety

Established in 1914, MSA Safety is the global leader in the development, manufacture and supply of safety products that protect people and facility infrastructures. Many MSA products integrate a combination of electronics, mechanical systems and advanced materials to protect users against hazardous or life-threatening situations.

MSA recently introduced the V-FLEX, V-FIT, and V-FORM harnesses into its V-SERIES line of safety products. These harnesses are game changers in the fall protection field, providing unparalleled safety and all-day comfort. New features include a racing style buckle for increased comfort, athletic fit design for improved flexibility and downward adjustability for easy adjustments that last throughout the work day.

Along with harnesses, MSA also works to improve safety in areas where harnesses are required. Our Engineered Systems division specializes in safety solutions for roofs, utility applications, confined spaces and other areas that require working at heights. Regardless of the height, or application, MSA has the products to keep your workers safe.

To learn more about fall protection solutions from MSA, visit [MSAsafety.com/applications/working-at-heights](https://MSAsafety.com/applications/working-at-heights)

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