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HEALTHIER WORKPLACES | A HEALTHIER WORLD



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# Preventing Heat Illness

By: **Paul A. Satti**, CSP, Technical Director, Construction Safety Council

Construction workers generally work outside and are exposed to heat and the damaging effects of the sun. Electricians also have to endure the stresses of working in enclosed spaces while wearing heavy protective clothing. Too much heat, especially if combined with high humidity can harm your health and interfere with work. Hot, humid conditions can cause heat exhaustion, cramps, and even fainting. A CSC study of fatalities reported last year (2012) between the summer months of June – September revealed that 11 workers died from sudden illness, most of which were reportedly caused by hot and/or overworked conditions. When your job is hot, know the precautions and take action to prevent heat related illnesses. If you supervise employees, learn your responsibilities under the Occupational Safety & Health Act; know the law.

The Occupational Safety & Health Administration (OSHA) has an on-going heat prevention campaign to remind us of these three words: **water, rest, and shade**; go to [www.osha.gov](http://www.osha.gov) for more information on OSHA's heat prevention campaign. Although no specific OSHA regulations regarding heat stress exist, everyone can agree that these dangers are real. OSHA's General Duty Clause reminds us that those employers

have a responsibility to protect against any recognized hazards that are likely to cause death or serious physical harm, especially when a feasible and useful method is available to correct the hazard. Working in the heat, especially when a "heat advisory" warning is being issued, employers must consider the hazards associated with heat stress and implement work practices and controls. These include:

- Monitoring the National Oceanic and Atmospheric Administration (NOAA) *Heat Index* chart and training workers to recognize the signs and symptoms of heat stress, heat exhaustion and heat stroke.
- Employers should encourage workers to drink water at liberty and establish provisions for a work/rest regimen when working outside. Water coolers must be clearly marked and tightly closed.
- Ensure that a shaded area is available to workers. When working inside, recognize how enclosed spaces can add to the heat index; electrical workers may find themselves in utility rooms and other poorly ventilated spaces (i.e., attics, crawlspaces, etc...) supervisors

must take note of these potential "hot spots" and take extra precaution.

- Recognize that the wearing of arc rated clothing and other personal protective equipment will add to a worker's heat stress and provide cooling packs, forced air ventilation or other forms of comfort.

Additional information OSHA's health and environmental standards, refer to 29 CFR 1926 Subpart D. Go to [www.osha.gov](http://www.osha.gov) to learn more, or contact the Construction Safety Council at 708-544-2082 x 213 for more information about \*Health Hazards in Construction. And as always, the CSC reminds you to... *Work Smart, Build Safe!*





# Five Keys to Construction Safety



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Hazards faced in the construction industry present unique issues that safety professionals and contractors must consider such as low bid processes, transient workforces, environmental conditions, multi-employer worksites and an always-changing jobsite.

While many elements go into creating a positive safety culture in construction, here are five important issues to consider when addressing worker safety.



## 1. EDUCATE THE WORKFORCE.

For workers to perform safely, they must understand the hazards they face on the job site. Transient workers may not be as familiar with the work being done nor the hazards involved.

Toolbox talks are one tactic contractors can employ to educate workers. These provide workers short informational sessions before a

shift that address the hazards associated with tasks they will be performing and how those hazards can be mitigated to help them perform their tasks safely.

## 2. LOOK OUT FOR WORKER WELL-BEING.

Along with the hazards workers face on the job site, other dangers have emerged as serious issues in the construction industry. A 2015 study from the CDC found that construction and excavation industries had the highest suicide rate among males of all major occupational groups. A 2018 study from the Midwest

Economic Policy Institute found that nearly 15 percent of construction workers suffer from substance abuse.

Protecting the safety and health of construction workers goes beyond mitigating hazards on the job site. Measures such as employee assistance programs provide a confidential forum for workers to discuss personal issues such as substance abuse or depression so they can get the help they need.

## 3. UNDERSTAND THE PROJECT.

When undertaking any project, all involved need a comprehensive understanding of the work to be performed, requirements that must be met and who is responsible for what tasks. This has added importance when contractors from multiple employers are working side by side, often with dozens of workers performing different tasks for various periods of time.

Given these circumstances, contractors, project managers and safety professionals need to be aware of regulatory requirements governing the work being performed. They must understand the range of different groups on their job site at any given time and what is expected of them in terms of project safety.

## 4. REMEMBER THE HIERARCHY OF CONTROLS.

In some cases on construction sites, personal protective equipment (PPE) may be used as the first line of defense in protecting workers from hazards. It's important to remember that the hierarchy of controls begins with elimination or substitution of hazards. These methods provide the greatest mitigation of hazards to protect workers and, therefore, should be pursued before moving further down the hierarchy to PPE. When PPE is used, it's essential that workers are trained on every component of the equipment so they can use it properly.

## 5. EMPLOY EFFECTIVE SAFETY MANAGEMENT.

Many businesses have a safety management system in place, whether they refer to it that way or not. It's reflected in how executives think about safety, the level of training provided to workers and the actions of those workers as they complete their tasks. To truly foster continuous improvement in occupational safety and health, organizations should go beyond compliance by implementing consensus safety standards.

The *ANSI/ASSP Z10.0-2019 Occupational Health and Safety Management Systems* is a comprehensive, systems-based standard that provides flexibility in tailoring its requirements to an organization's safety and health risks. ASSP provides implementation guidance from the experts through courses taught by members of the Z10 development committee and a thorough implementation guide designed to supplement the standard. To get started, download ASSP's free guide on keeping workers safe in small to medium sized organizations. Learn more at [www.assp.org/standards/standards-topics/osh-management-z10](http://www.assp.org/standards/standards-topics/osh-management-z10)





# PLAN FOR THE UNEXPECTED – KEEP YOUR WORKERS SAFE

Organizations that implement safety management systems go beyond compliance to identify and eliminate safety and health risks.

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# Falling Down Protection Should Be High on Your List

By: **IMPROV Learning**

Falls are the leading cause of fatalities in the construction industry, causing almost 400 deaths each year. Some 85 % of all falls that occur on the job result in lost work time.

All too often, seasoned workers and managers find themselves relying on past experiences—where they did not get caught breaking rules. Yet, this attitude can be the fast-track to financial and, even worse, fatal disasters.

## WHAT ARE EMPLOYERS' RESPONSIBILITIES?

Fall protection has many guidelines, and OSHA has made it very clear who is responsible for protecting workers. Companies and their safety managers cannot ignore their responsibilities.

OSHA's own website clearly states: "Initially, employers must assess the workplace to determine if walking or working surfaces have the necessary strength and structural integrity to safely support the workers. Once it is determined that the work surfaces will safely support the work activity, the employer must determine whether fall protection is required and, if so, select and provide workers with fall protection systems that comply with the criteria."

Generally, fall protection can be provided using guardrail systems, safety net systems or personal fall arrest systems (PFAS). OSHA refers to these systems

as "conventional fall protection." Other systems and methods of fall protection may be used when performing certain activities. For example, when working on formwork, a positioning device system could be utilized.

## MAJOR AREAS OF CONCERN

There are many components to putting together the right kind of plan for fall protection. Here are the most updated guidelines to follow.

## WALKING-WORKING SURFACES/FALL PROTECTION SYSTEMS

Historically, fall protection has been the most-violated OSHA standard; therefore, the agency has updated a final rule on walking-working surfaces.

The use of rope descent systems up to 300ft above a surface level is now permitted. PFASs can no longer include body belts, which are waist belts with D-rings or attachment points. Workers must receive training on personal fall protection and fall hazards and systems.

## ROOF WORK CHANGES

Formerly, OSHA stated no "safe distance" when it came to working on an unprotected roof edge. Under the new rule, if the distance is less than 6ft from the roof edge, conventional fall protection systems are required. This includes guardrail systems, PFASs and safety nets.

Additionally, employers can no longer use chains to close access openings. Similarly, no alternate options for parapets (a barrier that serves as an extension of the wall of a terrace, walkway or balcony) are allowed.

## STAIRWAYS, LADDERS AND GUARDRAILS

The new general industry regulations for guardrails, ladders and stairways now are associated with those in the construction industry. Employers must provide guardrails for all work at a height of 42in (+/- 3in) or higher.

For fixed ladders that are over 24ft, including structures for outdoor advertising, ladder safety systems or PFASs now are mandatory. The rule went into effect November 19, 2018, for new ladders and 2036 for all ladders.

"A worker's life can be forever altered or ended in the seconds it takes to fall," said Jeff Funke, OSHA's Area Director in Omaha. "Controlling contractors and subcontractors have a responsibility to protect workers on construction sites from falls, which cause four out of 10 workplace fatalities in the construction industry. More tragic than that is the reality that these falls are preventable."

## WORKPLACE ASSESSMENTS

Managers also need to ensure their employees know how to evaluate and



adjust whether walking-working surfaces will support the loads that will be placed on them.

For rope-descent systems that use anchorages, inspection is mandatory. This will help make sure each anchorage attached to a worker can support at least 5,000lbs in any direction.

## TRAINING FOR EMPLOYEES

Every single employee who uses personal fall protection and performs high-hazard work must be trained about the dangers of falls and how to properly use fall protection systems.

Historically, employee training always has required guidance from a qualified



individual. The latest rule specifically states what roles a “competent person” must be able to verify in an array of situations, including:

- ▶ Annual inspections of rope descent systems
- ▶ Inspections of knots in a lanyard or vertical lifelines
- ▶ Anchorage certifications

In addition, if there are any changes in workplace operations or equipment, or if an employer believes that additional training would be beneficial, employee re-training is essential.

### ALIGNMENT BETWEEN GENERAL AND CONSTRUCTION INDUSTRIES

The new walking-working surface regulation provides more consistency between general industry standards

and construction industry standards. These consist of the following:

- ▶ The ability to choose the fall protection systems that work best for your employees
- ▶ The criteria and practice requirements for guardrail systems
- ▶ Requirements for scaffolds
- ▶ Fall protection plans for unprotected sides and edges when performing roof work
- ▶ Requirements for safety net systems
- ▶ Requirements for rope-descent systems

While OSHA has made some extensive updates to its guidelines for fall protection, these variations were created with a safety mindset and are intended to help lower fatality and injury rates in workplaces across the nation.

### VIOLATIONS THAT COST MONEY AND LIVES

While these regulations seem burdensome, if not followed, they can lead to messy legal battles and drastic fines. Here are some recent stories that should scare you into double-checking everything.

A framing company subcontracted for framing work faced \$65,450 in fines for one willful and three serious safety violations. Midrails, screens, mesh, intermediate vertical members or equivalent intermediate structure members were not installed by the top edge of the guardrail system and the walking-working surface, when there was no wall or parapet wall at least 21in high.

A framing company in Georgia faced fines of \$33,000 for one willful violation and three serious violations. Guardrail system violations were the main issue.

Another company, based in Colorado, was issued six serious safety violations and faces proposed penalties of \$9,100. They had no written hazard communication program and no training on dealing with hazardous chemicals.

Yet another Colorado company faces proposed penalties of \$4,500 for three serious violations. Intermediate structure members were not installed by the top edge of the guardrail system and the walking-working surface was lacking wall or parapet wall at least 21in high.

Lastly, another construction company faces \$3,150 in proposed penalties for three serious violations. Midrails, screens, mesh, intermediate vertical members or equivalent intermediate structure members were not installed by the top edge of the guardrail system and the walking-working surface when there was no wall or parapet wall at least 21in high.

Don't let this happen to your company.

### HOW TO RECOVER OR GET AHEAD

If you find yourself in violation and facing fines due to non-compliance, or you want to be proactive with your company's fall protection, there is help available. OSHA's On-site Consultation Program offers free, confidential advice to small and medium-sized businesses in all states across the country. OSHA's On-site Consultation Program conducts over 29,000 visits to small business worksites, covering over 1.5 million workers across the nation. To find an On-site Consultation office in your state, or to request a brochure on Consultation Services, visit [www.osha.gov/consultation](http://www.osha.gov/consultation), or call 1-800-321-OSHA (6742).

Don't be afraid to reach out, as fall protection should be high on your list.



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AIHA represents the professionals and experts dedicated to identifying, evaluating, reducing, controlling, and preventing occupational health hazards. AIHA's Construction Committee works for the elimination of occupational illness and injury in the construction industry through advocacy, education and the promotion of the industrial hygiene practices. The committee has developed several guidance documents to raise awareness about health hazards in this sector, including [Focus Four Health in Construction](#) and [How to Improve the Safety Climate on Your Construction Site](#).

Construction contractors who want to protect the health of their workers, who are seeking resources, or want to hire an OHS professional can find help at AIHA's new website, [www.workerhealthsafety.org](http://www.workerhealthsafety.org). A free resource on the site developed by the AIHA Construction Committee is *Focus Four for Health*, a guidance document which provides practical ways for construction employers to identify and control hazards.



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**Preserving health is as important as safety in the construction industry.**

Visit AIHA's new [www.workerhealthsafety.org/construction](http://www.workerhealthsafety.org/construction) website and get your free *Focus Four Health: An Initiative to Address Four Major Construction Health Hazards* guidance document.



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### **Focus Four for Health**

An Initiative to Address Four Major Construction Health Hazards

Guidance Document



# Four Steps to Prevent Hearing Loss in Construction

*Noise might not seem as dangerous as other hazards present on construction and demolition sites, but it can have a tremendous impact on worker safety and health. Here are steps you can take to mitigate this risk.*

By: **Scott Fowler**, ASSP Content Specialist

photo courtesy Getty Images



Jackhammers drilling into the ground; saws cutting lumber; dump trucks and bulldozers moving materials—these are just a few examples of the noises construction workers encounter as they do their jobs each day. While noise may not seem as dangerous as other hazards present on construction and demolition sites, it can have a tremendous impact on worker safety and health.

The average construction site has a noise level of between 80-90 decibels (dB). CDC reports that approximately 51 % of construction workers have been exposed to hazardous noise and 31 % of those workers report not wearing hearing protection. Furthermore, approximately 14 % of all construction workers have hearing difficulty.

How can you know if your job site is too loud? What steps can you take to protect workers' hearing? Here are four steps you can follow.

## KNOW THE LIMITS

The first step of protecting workers' hearing is understanding the level at which workplace noise can be hazardous. ANSI/ASSP A10.46, Hearing Loss Prevention for Construction and Demolition Workers establishes an acceptable noise level of 85dB over an 8-hour day, with a 3-dB doubling rate. As defined by NIOSH, a 3-dB doubling rate means that for every 3-dB increase in noise level, the allowable exposure time is reduced by half and, conversely, a 3-dB decrease in noise level doubles the allowable exposure time.

Technology has made it possible for employers and safety professionals to determine the noise levels of their job sites. Sound level meters can be downloaded onto a smartphone that can be used to accurately identify noisy tasks.

Another useful tool is Appendix 2 of the A10.46 standard, which provides probable noise levels of common construction tools and equipment, such as air hammers, electric grinders, nail guns and circular saws. Using this appendix as a guide, you can determine what noise levels could be at different areas of the job site and take appropriate measures to protect workers' hearing.

## ESTABLISH A SAFE DISTANCE

Once you determine the noise levels throughout your site, you can institute engineering controls to minimize the hazardous noise. Engineering controls could include retrofits or mufflers for older equipment, or siting equipment away from workers. Some pieces of noisy equipment, such as an air compressor, can be sited 10-15ft away from where work is being performed. You can also rotate workers between noisier tasks and quieter tasks to minimize their risk.

Along with minimizing noise levels, engineering controls can also help you evaluate your noise-reduction program. Using a sound level meter, you can see if you are effectively reducing or controlling noise levels.

## USE THE LATEST TOOLS

Once engineering controls are in place, use PPE to provide an extra barrier between workers and hazardous

noise. Advances in hearing technology have made it possible for workers to protect their hearing, while still being able to communicate with coworkers and help them be more aware of the activity on the job site.

For example, electronic earmuffs contain a microphone that monitors noise levels and will reduce the noise level inside the earmuff to 85dB or below, thereby allowing for easier communication between workers—and encouraging consistent use of the earmuffs.

## TEACH YOUR WORKERS

In addition to reminding workers how to properly wear hearing protection, you should also explain why workers need to wear it consistently and the potential long-term health impacts of not wearing hearing protection. Scheduling regular hearing tests for workers is an important preventative step, as well.

Workers also need to recognize that workplace noise is not just a health hazard. It can be a safety hazard, if noise hinders communication or prevents them from hearing a piece of machinery moving toward them. It is in everyone's best interests to have administrative and engineering controls in place, and to properly wear hearing protection to reduce exposure to hazardous noise.

Since hearing loss occurs gradually and can have a dramatic effect on one's quality of life, it's best to take preventative measures to avoid hearing loss from occurring in the first place.



# Customizing Heat-Related Work/Rest Schedules

By: **Nicole Moyen**, Contributor

The hot working days of summer are upon us, bringing the added risk of heat injuries and fatalities for workers with them. Summer 2020 is forecasted to be the hottest one on record. One of the most important ways to prevent heat stress among the workforce this year—and every year—is to implement an appropriate, effective work/rest schedule on site.

Sounds easy enough, but there's no standard work/rest schedule that fits all people. Implementing the same cadence of work then rest for all won't prevent heat injury or illness for every person.

Standard work/rest schedules for people working in hot conditions were developed based on studies of young, healthy men. This means other populations of workers were not taken into consideration when standard schedules were designed and recommended by various organizations and governing bodies that advise on occupational health and safety. There are many groups for which these work/rest schedules might not work, including older individuals, women and workers who have certain health conditions. The standard work/rest schedules aren't flexible enough to accommodate the individual needs of multiple employees, "thereby leaving a large segment of the population under-protected."<sup>1</sup>

There are standard work/rest schedules from OSHA, NIOSH and the U.S. Army, which are fairly similar across worker population groups. And, there are agreed-upon work/rest schedules from the International Organization for Standardization (ISO).

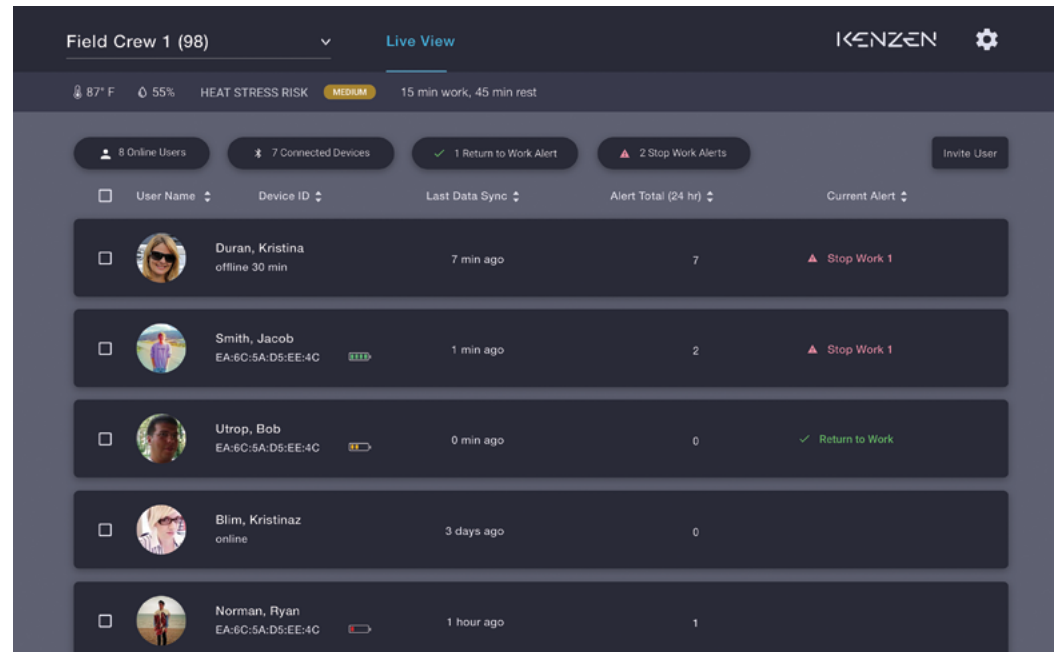
It's important to understand the differences in standards, so you can pick the best one for your team, and know how to adapt it for the individuals on your team—based on their needs.

## HOW TO CHOOSE WISELY

You should pick a work/rest schedule based on what you have available at your site and which environmental conditions are most important. For example, some work/rest schedules are based on WBGT, which is an index that combines the stress from radiative heat (black globe), ambient temperature (dry bulb) and humidity (wet globe) to assess overall risk of the environment. However, you need a black globe monitor to assess radiative heat, and some sites do not have this measurement tool. If you do not have a black globe monitor as a part of your weather station, then you should select a work/rest schedule that does not

use radiative heat (or WBGT), but factors in whether the workers are in partial or full sun, or working in the shade.

Some work/rest schedules include how many clothing layers workers wear, while others do not. That being said, if your workers are wearing two-three layers of clothing (or PPE), make sure you are using a work/rest schedule that accounts for extra clothing layers. The work/rest schedule



Natural and external factors affecting a person's ability to work in the heat are out of your control, but you have control in adapting the work/rest schedule of your team. Vigilantly observe and monitor the individuals on your team and adapt their work/rest schedule as needed. (photo courtesy Kenzen)

<sup>1</sup> Kenny, G.P., Notley, S.R., Flouris, A.D. and Grundstein, A., 2020. Climate Change and Heat Exposure: Impact on Health in Occupational and General Populations. In *Exertional Heat Illness* (pp. 225-261). Springer, Cham.

you select should always include the worksite temperature and humidity, along with the workers' work rate or intensity.

Additional factors to consider are the sun (black globe) and the clothing level. If your workers are indoors, you do not need to consider the sun, and the WBGT would be an inappropriate index. Consider which factors are most important to your workers at their specific work location, and use a work/rest table that accounts for those variables.

### CUSTOMIZE FOR INDIVIDUAL WORKERS' NEEDS

After you've selected a work/rest schedule that makes sense for your site, you will need to consider individual characteristics that might modify that schedule. Every worker on your team comes to the job with unique physiological characteristics that should be taken into consideration when it's time for them to work and time for them to rest. Natural factors make each person susceptible to heat-related injuries and illnesses in different ways.

- **Age** After age 35, the body's ability to dissipate heat, primarily through sweating, declines. As a result, older adults tend to have higher core body temperatures than younger adults, when working at the same rate in the heat. This difference between older and younger individuals can be minimized with heat acclimatization (gradually building up your tolerance to the heat over one-two weeks). Endurance training—undertaking healthy exercise, like running or biking, in hot conditions—will also prepare someone to better withstand working in the heat. Make sure older adults are heat-acclimatized before spending long periods of time in the heat, and note that they might need to stop working before the younger individuals on the team.
- **Genetics** Some people are able to acclimatize faster and tolerate the heat better than others; some of this

appears to be attributable to genetic makeup. Heat acclimatization for an entire team can help level the playing field. If an entire team has not been working lately, or it's the first hot day of the season, the team will benefit from a work/rest schedule that allows for more rest during the first few days of the job, to allow for acclimatization.

- **Diseases** Various skin disorders (e.g., psoriasis), cardiovascular diseases (hypertension), sweat gland disorders (Type I and Type II diabetes), and metabolic disorders can impair the body's ability to effectively thermoregulate. This means core body temperature will be higher for individuals who have these conditions, when working at the same intensity as someone without these diseases. This person might need more frequent breaks or an altered work/rest schedule to successfully manage long days of work in the heat.
- **Gender** Men generally have a higher sweat rate than women, as men are usually larger than women. This is important to consider, because sweating is the best way to get rid of body heat to keep the core body temperature in a safe range. In hot-dry (low humidity) climates, men will likely be able to work for a longer period of time with a lower core temperature than women, because they are better able to get rid of body heat through increased sweating. In hot-humid climates, women will likely be able to work for a longer period of time in the heat (with a lower core temperature), because their lower sweat rate will keep them from losing body water (through sweating) that isn't evaporating and cooling. Men, on the other hand, due to their higher sweat rate, will be losing a lot of body water through sweating, because it won't be evaporating in the high



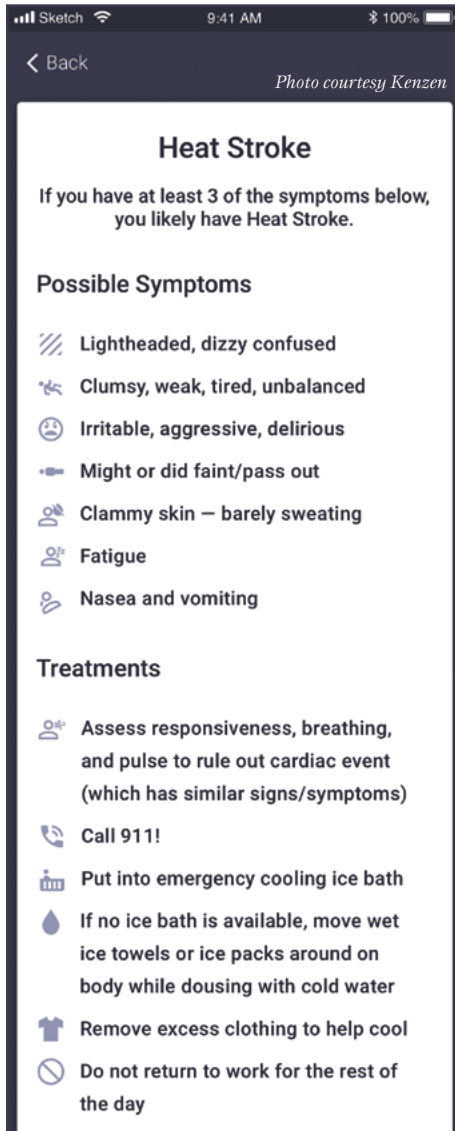
Men generally have a higher sweat rate than women, as men are usually larger than women. This is important to consider, because sweating is the best way to get rid of body heat to keep the core body temperature in a safe range. (photos courtesy Kenzen)

humidity. So men will become dehydrated more quickly than women and, therefore, experience a faster increase in core temperature.

With this knowledge, you can better alter the work/rest schedules for your team. Remember that during a rest period, the worker needs to *actually* rest and rehydrate in order for these work/rest schedules to be effective.

Other factors that may require the alteration of work/rest schedules:

- **Drugs that affect the nervous system**, such as antidepressants, sympathomimetics, anticholinergics and antipsychotics. These drugs have been shown to impair sweat gland function and increase heat production. Employees regularly taking these drugs will likely have a higher core body temperature for the same work rate than someone who is not taking these medications, so they might need shorter work periods and/or more rest each hour.



- **Antihistamines** (e.g., allergy medications). These drugs can impair sweat gland function, making it harder for an employee to get rid of heat as readily, which can lead to an increased core body temperature. Again, those on antihistamines may need more rest each hour to stay productive and safe.

• **Drugs that affect the cardiovascular system, such as beta blockers and calcium channel blockers**). These drugs work to lower the heart rate. This is a problem when working in the heat, because the body needs a higher heart rate to be able to pump blood to the skin (to get rid of heat) and the working muscles (for energy). As a result of the lower heart rate induced by these drugs, an employee's body might heat up faster and have a harder time maintaining a high work rate in the heat. More rest might be required for these individuals, and it is advised to monitor their heart rate throughout the workday.

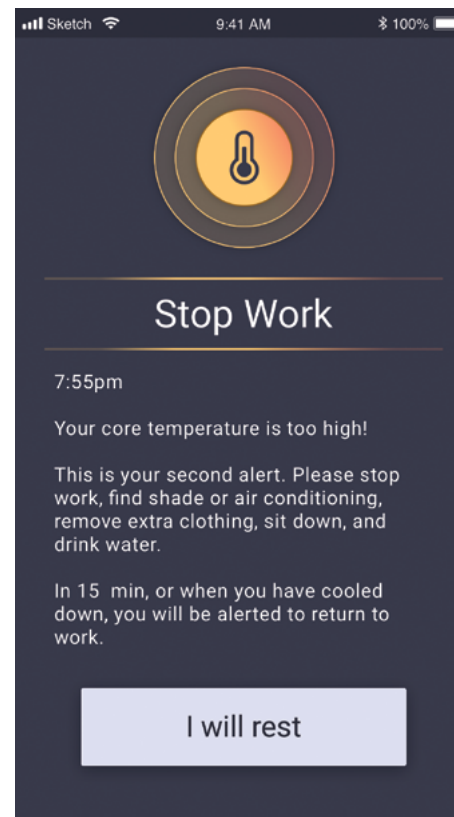
• **Diuretics**. These drugs make it difficult for a person to stay hydrated, which means that in the heat, the body will be working extra hard to keep cool. Remember, dehydration exacerbates the effects of heat stress, so allow these individuals to carry water with them and take more frequent water breaks.

• **Fitness**. Employees who are more fit can better handle the heat. Endurance exercise leads to similar adaptations as those gained with heat acclimatization. This means that individuals who are more fit will better tolerate the heat. Therefore, these individuals might be able to work longer (and take less rest) than the prescribed work/rest schedule.

• **Nutritional intake**. Poor nutrition and excessive caffeine, alcohol and nicotine can reduce the body's ability to work effectively in the heat. Be sure to stress to your employees the

importance of eating healthy foods and minimizing drug and alcohol use, especially on hot days.

While both natural and external factors affecting a person's ability to work in the heat are out of your control, you do have control in adapting the work/rest schedule of your team and each individual to ensure they are staying safe and productive on the job. Vigilantly observe and monitor the individuals on your team and adapt their work/rest



Summer 2020 is forecasted to be the hottest one on record. An important way to prevent heat stress among the workforce is to implement an appropriate, effective work/rest schedule on site. (photo courtesy Kenzen)

schedule as needed. Encourage the team to monitor each other through buddy systems. Consider using smart PPE or physiological monitoring devices that can detect unsafe core body temperatures, and then relay that information back to the manager.

Individualized monitoring is the way of the future: It will allow you to intervene before it's too late, so you can prevent heat injuries and illnesses on the worksite—while keeping productivity high. Remember: one size does not fit all when it comes to work/rest schedules. Be knowledgeable and accommodating to keep workers healthy and productive at work, especially under hot conditions.



#### ABOUT THE AUTHOR

Nicole Moyen, Vice President of R&D at Kenzen, and heat stress blogger, leads R&D at Kenzen, the smart PPE innovator focused on physiological monitoring and the prevention of heat injury and death among workers. Kenzen's real-time heat monitoring system is used by companies to keep workers safe from heat. Moyen has a decade of research experience in industry and academia related to human physiology and wearable devices, and advises companies on heat stress physiology and dehydration.



# See the Importance of Eye Protection

By: **Heather Perl**, *Improv Learning*

Each day, across the U.S., almost 2,000 workers suffer eye injuries that require medical treatment. Along with the potential personal devastation that comes with an eye injury, OSHA estimates that these types of accidents cost businesses over \$300 million per year. Sadly, experts believe that, in as many as 90 % of these cases, eye damage could have been lessened or completely avoided—if workers had been wearing personal eye protection.



According to the National Institute for Occupational Safety and Health, small objects, such as wood chips, metal slivers, sparks or dust, cause the majority of workplace eye injuries. Larger objects, such as nails, staples and screws, and some tools, also pose a significant threat to the unprotected eye. While less frequent, burns from chemicals and even cleaning products may be just as serious.

## HOW TO FIND THE OPTIMAL PROTECTIVE EYEWEAR

For the most part, protective eyewear comes in two types: safety glasses and safety goggles. Finding the best protection for any given situation requires an evaluation of the workplace environment and its potential hazards.

Typical safety concerns fall into at least one of four different categories: mechanical, temperature, chemical or radiation. Mechanical hazards consist mainly of flying particles generated by tools or machines. Metal splashes, hot liquids and intense heat radiation fall into the temperature category. Laser light or UV radiation are two examples of radiation dangers. Chemical hazards include cleaning fluids, gasses, chemical splashes and, at times, even dust.

In general, safety glasses work fine in preventing most mechanical and radiation injuries. Environments where chemical or temperature hazards come into play usually require the more comprehensive coverage that goggles provide.

Lens material also plays an important part in choosing the proper personal eye protection. Acrylic, polycarbonate, NXT polyurethane and optical glass are the four most common materials used in protective lenses. Each has its own set of pros and cons.

Polycarbonate lenses provide excellent impact and scratch resistance; are light in weight; and offer good UV protection. However, their optical clarity falls below that of NXT polyurethane or optical glass. Also lightweight and scratch-resistant, NXT Polyurethane (Trivex) offers excellent optical clarity.

Acrylic lenses protect best against solvents, but tend to scratch easily and don't hold up as well as the others. Heavier optical glass lenses provide excellent scratch resistance and distortion-free vision, but have poor impact resistance. Optical glass and polyurethane lenses typically cost more than their acrylic and polycarbonate counterparts.

To provide sufficient coverage, protective eyewear should be either adjustable or fitted to each worker. Along with the proper level of protection, comfort also matters when choosing proper workplace eyewear. Safety glasses sitting on the shelf or in the shirt pocket serve no purpose. Some comfort-enhancing features found on today's safety eyewear include:

- ▶ Cushioned brows
- ▶ Adjustable lenses
- ▶ Anti-fog lenses
- ▶ An interchangeable head strap
- ▶ Padded or gel nose bridges
- ▶ Vented frames
- ▶ Flexible temples

Looks are also a factor to consider when it comes to protective eyewear and worker compliance. Features such as mirrored lenses, wraparound frames and sport styling encourage workers to put their glasses on and keep them on—especially on outdoor job-sites.



## ANOTHER GOOD REASON TO PROVIDE PROPER EYE PROTECTION

Aside from the personal devastation that eye injuries cause, companies that don't provide proper safety gear and enforce safety protocols may find themselves financially liable, as well.

In one recent settlement, a construction worker received \$2.65 million for permanent damage incurred when a nail ricocheted backward and struck his left eye. The worker claimed that he had requested protective eyewear, but was instructed to work without it. Another case highlights the importance of enforcing safety rules. In this case, a 20-year-old electrician was standing on a ladder and working on a ceiling and not wearing eye protection, when another employee grabbed his leg as a prank. Startled, the man pulled his wire cutters into his right eye.

Although the injured man wasn't wearing the required eye protection, a jury found both the construction company and their employee 80% at fault, and they awarded \$1.6 million dollars. Although the company provided the injured party with safety glasses, and he chose not to wear them, a jury still found him only 10% liable for the incident.

Considering that safety eyewear for most applications costs less than \$5 per pair, employers have no excuse not to provide workers with the proper protection. Providing the correct safety gear and enforcing safety protocols protects workers from personal injury; saves money; creates a professional workplace atmosphere; and, most of all, is the right the thing to do.





# Protect Workers from Falling Objects

*A Tool Falling from a 100ft Construction Site Will Hit the Ground in Less Than Two Seconds!*

By: **John Salentine**, Co-founder & Vice President, Hammerhead Industries Inc.

Correct tool tethering is a delicate balance of maximizing productivity, while safely minimizing the incidence of tools dropped from aloft. This article will help you select the proper tether—based on tool weight and usage—to provide effective tethering solutions that significantly improve productivity and safety.

In its rapid descent, a falling hammer can become an unguided missile that may seriously endanger everything and everyone below. It is a serious site-safety

issue. At best, the falling object will just increase maintenance costs by downtime spent retrieving and repairing the dropped tool; at worst, it will cause serious injury to personnel and significant damage to equipment. It is a situation that can be easily avoided by using a properly matched tool or instrument tether.

According to a recent Liberty Mutual's Safety Index, accidents caused by objects falling from above cost U.S. industry more than \$5 billion last year and was

the fifth-leading cost of industrial accidents. This is a staggering figure, yet this type of accident is almost completely preventable by using relatively inexpensive tethering devices. OSHA Reg #1926.759 (a) states that equipment and tools, which are not in use while aloft, shall be secured against accidental displacement.

This article addresses the three overriding objectives the safety engineer must consider when buying tethers for employees.

**Employee Safety** – Obviously, the objective of tethering tools is to avoid tools falling from above, but what are the factors impacting the safety of the employee using the tether?

**Employee Productivity** - Does the tool lanyard interfere with the duties of the job or make it easier and safer to do the job?

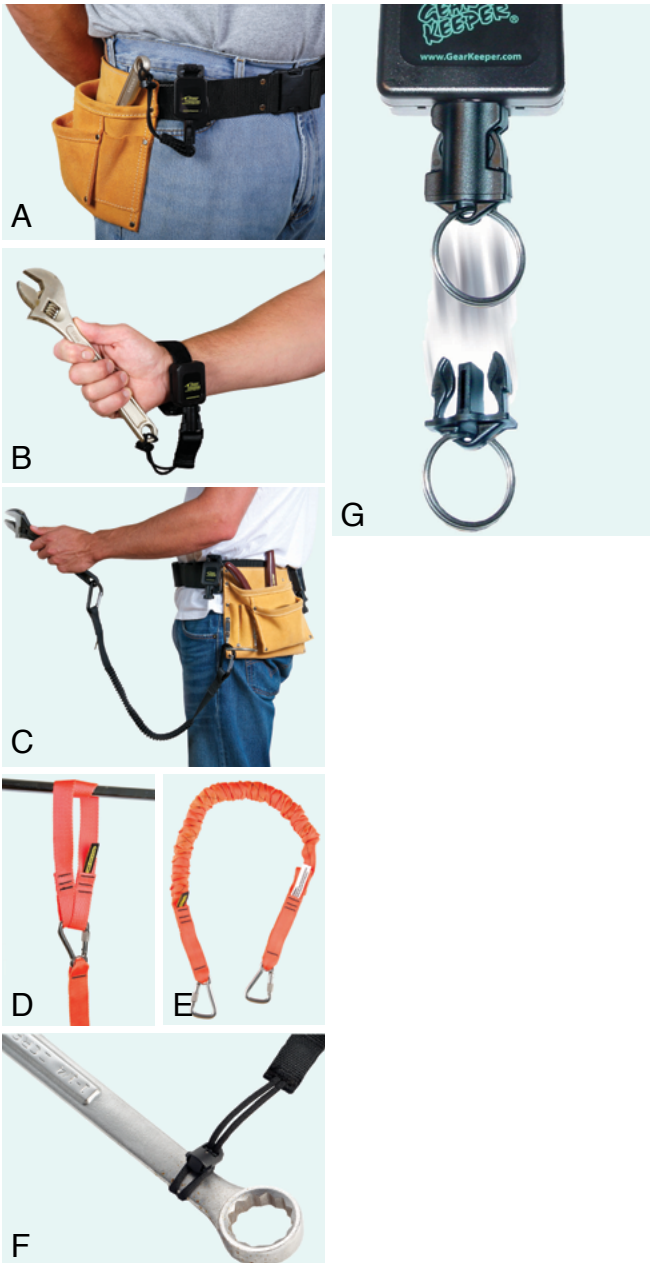
**Employee Attitude** - How can I make the worker my partner in tethering safety?

In addition, the article will ask and answer the questions safety engineers must know:

- Depending on the application, what is better choice for the worker's safety: a retractable tool tether or tool lanyard tether?
- What are the safety implications of tethering when the job entails climbing, crawling or repelling?
- What are the optimum methods of safely attaching the tether to the worker...tool...or instrument?
- How do you safely tether tools or instruments that don't have fittings for attachment?
- Does the tether have a quick release option to easily change tools and how does this impact the safety of the worker?
- Can you rely on the manufacturer's "load limit" designation of the tether?







- Where can you find custom tethering solutions for special applications or tools?

The safety engineer's goal in correct tethering procedures is to make sure the tool, application and recoil/retraction force are in balance. Ideally, when the tool is extended for use, only minimal force should be necessary, so as to prevent worker fatigue or, in the reverse, cause a "kick" when retracted. The challenge to the safety engineer is to provide a tether that is both friendly to the user and appropriate for the work environment. Equally important, the tether or lanyard must have ample safety margins, beyond the weight rating of the tether, to mitigate the drop force in the event of a dropped tool.

With such a high risk to workers' safety, here is a simplified guide to help you select tethers for tools weighing up to 25 pounds.

Tool and instrument tethers fall into five broad categories:

A) Retractable Lanyards, B) Wrist Lanyards, C) Personal Tethers, D) Personal Tether, and E) Anchor Tether w/Anchor Strap

#### STEP 1. DETERMINE TOOL TETHER TYPE BASED ON TOOL WEIGHT AND USAGE

The most common tool tethers and lanyards for tools up to 25lbs generally fall into five categories: Retractable Lanyards; Wrist Lanyards; Personal Tethers; Personal Tethers with Anchor Strap; and Anchored Tethers.

For tools up to 2lbs, the following options are best:

- Retractable Lanyards provide an ultra-low profile to keep the tool close to the body. This is

important for working in confined-space and/or when climbing is required. They are also ideal for multiple tether use. (Photo A)

- Wrist Lanyards are low-profile tethers that provide a short drop length for easy retrieval of a dropped hand tool. (Photo B)
- Personal Tool Tethers are best for single-use tools that moves with the worker. (Photo C)
- Personal Tool Tether w/Anchor Strap for single-use tools attached to a structure for additional security or ease of use. (Photo D)

For tools up to 15lbs, the following options are best:

- Personal Tool Tethers are best for a single-use tool that moves with the worker. (Photo C)
- Personal Tool Tether w/ Anchor Strap for a single-use tool that is attached to a structure. (Photo D)
- Anchored Tether System that attaches a heavy tool (5lbs or more) to a structure. (Photo E)

For tools up to 25lbs, the following options are best:

- Personal Tool Tether w/ Anchor Strap for a single-use tool that is attached to a structure. (Photo D)
- Anchored Tether System that attaches a heavy tool to a structure. (Photo E)

*Note: Generally, any tool over 5lbs should always be anchored to a structure to transfer the "dropped tool" shock load from the person to the structure.*

## STEP 2. DETERMINE IF TETHER IS FOR SINGLE TOOL OR MULTI-TOOL USE

A) A Fixed Lanyard System is acceptable when you don't need to remove a tool from the lanyard. (Photo F)

B) When easy tool change-out is required a Side Release Lanyard System or Carabiner Clip are the best options. (Photo G)

## STEP 3. DETERMINE THE TOOL ATTACHMENT POINT

A) Tool has lanyard loop. Attach lanyard to loop.

B) Tool has large ends. Ends must be large enough to allow a lanyard to be looped and cinched securely without slipping off.

C) Tool has small ends or no lanyard loop. If tool does not have large enough ends (looped lanyard would slide off) or lacks a lanyard loop, you must attach a ring.

D) Tool modification. If none of the above works, the tool must be modified by a safety engineer or the tool manufacturer.

## IN CONCLUSION, WHEN CHOOSING TETHERS, HERE ARE NINE POINTS TO KEEP IN MIND:

1. Choose your tethers based on all factors of use. There are thousands of tethering choices available from manufacturers specializing in tool, gear and instrument tethers to tool manufacturers.

2. When tool tethers are ordered without specifications beyond the weight of the tool, chances are good that the tether may not be appropriate. Unlike fall-protection devices, there are no universal specifications governing tool tethers. As such, the safety

engineer has no real basis for choosing proper tethers and may arbitrarily determine tether selection—based solely on the weight of the tool, i.e., “I need a tether for a 3lb tool.” Without additional specifications, this may be creating a potentially dangerous situation.

3. An improperly mated tool and lanyard can inherently lead to reduced productivity and exposure to injury.

4. Tethering heavy tools to a person (generally over 5lbs), is a significant safety concern, and safety engineers should instead consider using anchor tethers. Anchored tethering safely transfers the shock load produced by a dropped tool from the worker to the structure.

5. For very heavy tools (over 10lbs), structure anchoring should be mandatory.

6. When choosing an “Anchored Tethering System” choose one that offers up to a 10ft working length for maximum safety and efficiency.

7. Modular tethering systems offer the most options for safe tool tethering

8. When employees are using a group of small hand tools (under 2lbs), Quick Connect tethers offer easy tool change-out and avoid the entanglement danger of having multiple tethers.

9. Before you purchase a tool or instrument tethering system, make sure that the tethers and lanyards are dynamically load tested for the tool weight specified. Confirm that the tool tether weight ratings indicated have a safety margin beyond the break point, so the tether or lanyard can safely handle the shock load of a dropped tool or instrument.

*Editor's note: John Salentine co-founded and is Vice President of Hammerhead Industries Inc., manufacturers of the Gear Keeper tethering systems. For almost two decades, they have been the world's leading manufacturer of retractable tethers and lanyards exclusively for tools, gear and instruments. The company looks forward to assisting safety engineers with their tethering needs and offers a free 12-page “Safety Engineer's Tool and Instrument Tethering Guide.” [gearkeeper.com/guide](http://gearkeeper.com/guide)*

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