

Construction Safety, Part II

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New Product Launch Announcement

Kyorene® Pro - 00-810

Armor Guys is proud to introduce the newest addition to the Kyorene® Pro family of gloves, the 00-810. The 00-810 is a revolutionary general purpose 18g Kyorene® Pro graphene liner with our proprietary HCT® micro-foam nitrile

palm coating, hi-vis reinforced thumb crotch and is touch screen compatible.

These ANSI A1 cut resistant graphene-based gloves are ideal for light duty, general purpose work applications which

perform exceptionally well in both oily and dry applications. Offering ANSI Level 6 abrasion as well, users can be assured of exceptional durability in the toughest of applications. In addition, the 00-810 offers excellent tactile sensitivity and dexterity, allowing wearers to perform fine motor skills without having to remove their gloves. The 00-810 gloves offer enhanced ergonomics as they are dipped on hand formers that follow the natural curvature of the hand which provides the wearer unparalleled fit, feel and comfort while allowing one's hands to work comfortably all day long.

The 00-810 gloves retain the inherent properties that make Kyorene® Pro gloves unique and a first to market product. Three key features of the 00-810 are its bacteriostatic, thermal regulating and odor neutralizing capabilities. These features provide for gloves that actively regulate bacteria on the hands, allow heat to dissipate from them and combat the foul odor that is associated with sweaty gloves. Kyorene® Pro gloves solve the long-standing issue of hot, sweaty and smelly gloves being discarded prematurely.

The Kyorene® Pro 00-810's benefit the wearer like nothing before! The only gloves on the market verified by *The Graphene Council* as a *Verified Graphene*

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New Improvements in ISEA/ANSI 105 Glove Labeling Make Hand Protection Simpler for Construction Safety

By Donald F Groce, Contributor

Proposed changes in the American National Standard for Hand Protection Classification ANSI/ISEA 105-2016 are expected to be adopted in the very near future by the International Safety Equipment Association. These changes have resulted in an even better tool for providing safer hand protection for those of us who face hand injury hazards daily in the construction industry.

Those of us who work in the industry know that historically, hand protection needs do not decline during undesirable economic times. Workers must be protected every day from every hazard that could cause life-altering injuries. Many injuries could permanently

redefine our ability to perform the tasks required by our livelihood. Even when the economy causes jobs to slow and the cost of construction materials to skyrocket and be in short supply, we all need the full range of hand protection from mechanical, physical, and chemical hazards. Dexterity is not considered a hazard but is a major factor in hand protection safety. Sometimes a task is even more hazardous when using poorly fitted hand protection. Workers take off their gloves to perform a fine motor task and get injured when hands are unprotected.

New Labeling ICON: The new labeling icon includes a “home plate” pentagon shape with the ANSI/ISEA 105 Performance Classification Levels on each side of the icon. The Cut Resistance Performance Classification (Level A1 to A9) is along the top line. The Abrasion Resistance Performance Classification (Level 0 to 6) is on the left side of the pentagon. The Puncture Resistance Performance Classification (Level 0 to 5) is on the right side of the icon. The example below shows a Global Glove stamp that performed at ANSI/ISEA 105 Cut Level A9, Abrasion Level 3, and Puncture Level 4.

You can tell at a glance the performance level for three of the main determining qualifiers for glove selection for Construction Safety.

GREAT NEWS FOR THE CONSTRUCTION INDUSTRY

New advancements in cut-resistant fiber technology have resulted in more cut-resistant gloves than any other point in history. Cut-Resistant gloves remain the

CLASSIFICATION FOR CUT RESISTANCE

LEVEL	WEIGHT (GRAMS) NEEDED TO CUT THROUGH MATERIAL WITH 20 MM OF BLADE TRAVEL
A1	>200
A2	>500
A3	>1000
A4	>1500
A5	>2200
A6	>3000
A7	>4000
A8	>5000
A9	>6000

fastest growing category of gloves and have been for a number of years.

Cut Protection: New developments in fiber engineering technology have brought new even higher cut levels than ever seen before. Some cut levels have measured far above the more recent ANSI 105-2016 American National Standard for Hand Protection Classification which includes an expanded ANSI Cut Level Rating system. Now there are ANSI/ISEA 105 Cut Levels of A1 to A9, with the highest Cut Level A9 being any material that cuts through with a weight of > 6000 grams. We have tested new gloves that are very supple and wearable that measure almost twice the requirements



to be classified as Cut Level A9, with almost 12,000 grams of cut resistance.

Price Considerations: As you may expect, you pay more for more protection. The higher cut level performance gloves are generally more expensive. Most new developments have been very costly to engineer. But, what is your hand safety and the long-term use of your hands worth? You cannot put a price tag on injury prevention. Your hands affect every area of your life and wellbeing.

TYPES OF CUT-RESISTANT GLOVES

Aramid: Many cut-resistant gloves are made from Aramid (aromatic polyamide) fibers that may have brand names DuPont™ Kevlar®, Bulwark® Nomex®, Teijin Aramid BV Twaron®, or Global Glove Aralene®. Aramid fibers were some of the first developed fibers

with many other safety applications including body armor, hard hats, and gloves. Aramid fibers are also flame resistant. They can be made in different gauges, usually 7, 10, 13, 15, and even 18 gauge and can be strengthened by special treatment with ceramics or by twisting with stainless steel, glass fiber, etc.

UHMWPE/HPPE: High Performance Polyethylene (HPPE) fibers or UHMWPE Ultra High Molecular Weight Polyethylene are specially engineered by extruding polyethylene into fibers and twisting the fibers under high temperature and pressure. The resulting gloves are very abrasion and cut resistant. These fibers are not flame resistant. Like Aramid fibers, they can be made in different gauges, usually 7, 10, 13, 15, 18, and even 21 gauge and can also be strengthened by special treatment with ceramics or by twisting with stainless steel, glass fiber, etc. Some of the brand names include DSM® Dyneema® or Global Glove Tuffalene®.

Dexterity: All glove manufacturers are continually improving their product offerings and searching for better protection for the industries and workers they are serving. To make a cut-resistant glove normally requires more material thickness to gain a higher cut level. However, recent developments and advancements have resulted in even thinner gauge cut-resistant yarns that are extremely cut resistant and even higher than ever before. The goal has always been to provide more comfort, dexterity, and bare-hand sensitivity for workers. The desired result is they will always wear their gloves to complete even tasks that require maximum motor dexterity and fine touch sensitivity. So, in construction jobs, it will be easier to convince workers to keep their gloves on and minimize the risks of hand injury.

Abrasion Resistance: Abrasion resistance performance for the ANSI/ISEA 105 standard is measured using a Taber® rotary platform abrader. The exact same

CLASSIFICATION FOR PUNCTURE RESISTANCE

LEVEL	PUNCTURE FORCE (NEWTONS)
0	< 10
1	> 10
2	> 20
3	> 60
4	> 100
5	> 150

type of abrasion testing equipment is used throughout the textile industry to measure how long carpet and flooring will wear as a quality assurance measure.

A weighted load of either 500 grams or 1000 grams is applied to the special pumice H-18 abrasive wheels which turn the designated number of cycles on the surface of the glove material. The end-point of the test is when the sample has a hole all the way through the coating and the liner. The levels are:

Impact Protection: Impact protection is needed in many different construction jobs as well as occupations such as mining, automotive mechanic work, or assembly. Many impact injuries to the dorsal or top of the hand can be reduced with the addition of impact pads to the gloves. Common materials for impact protection include TPR, TPU, and Silicone, though new material pads are and will continue to be developed to maximize protection, comfort, and dexterity. Many manufacturers will use impact test data from either ANSI/ISEA 138 or EN 13574 standard test methods to categorize impact protection. The impact protection ratings for ANSI/ISEA 138 are assigned based upon the amount or percent of impact force absorbed by the impact material. The greater the percentage absorbed, the less impact on

CLASSIFICATION OF ABRASION RESISTANCE

LEVEL (500 GRAM LOAD)	ABRASION CYCLES TO FAIL
0	<100
1	>100
2	>500
3	>1000

LEVEL (1000 GRAM LOAD)	ABRASION CYCLES TO FAIL
4	>3000
5	>10000
6	>20000

the hand. Now that the standard is published with the ratings, manufacturers will search for the best impact materials that absorb the most impact force.

Puncture Resistance Classification: Puncture Resistance for the ANSI/ISEA 105 Performance Classification is based on EN 388:2003 for a nail-like probe. There are five performance levels based on the force (Newtons) to puncture. The results are determined from an average of 12 punctures.

The highest rating for this type of puncture are found in gloves made from combinations of Alycore®, leather, in coated Tuffalene® UHMWPE gloves, and in coated Aramid gloves. We feel that it is important to know the puncture resistance level for both the coated palm and the uncoated backs of many gloves differ. Sometimes the difference is pretty dramatic. The glove palm is generally the most likely area to need protection from punctures. However, the uncoated portions of the glove can also be punctured and result in an injury.

Chemical Resistance: Chemical Resistant Gloves have not seen many breakthrough products introduced in recent years. The main new gloves that offer protection from mixtures of chemicals include PVA/Nitrile gloves and TPE disposable gloves.

Multi-Hazard Environment: The future safety marketplace will always see an increase in multi-hazard gloves that protect from more than just one hazard. The reality is that there is never just one hazard. Combining the strengths of protection from mechanical, physical, and chemical risks will fit many of the new jobs of the future.

The new ANSI/ISEA 105 labeling icon from the upcoming edition of the ANSI/ISEA 105 American National Standard for Hand Protection Classification will provide an easy-to-use tool for assessing the proper glove for the hazard at hand. With a little knowledge of what

the levels mean, employers in the construction industry can use the icon as an excellent tool in making decisions that will keep hands safer and also utilize better stewardship of financial resources. The new home plate design icon will help you hit a “homerun in hand protection.” Protecting workers hands are what we are all about!

The ANSI/ISEA 105 American National Standard for Hand Protection Classification labeling icon design is not required by law, unlike CE Requirements in Europe. We do, however, feel that the practice of ANSI/ISEA

labeling is very popular and that the new icon labeling design will catch on. Some companies have already started redesigning their labels to conform to the new labeling requirements. ■

Donald F. Groce of Global Glove and Safety Manufacturing (www.globalglove.com) is an Analytical Chemist and longtime expert in protection of workers from exposure to hazardous chemicals and issues related to hand protection. He has published more than 50 articles related to exposure to hazardous chemicals, cut hazards, proposition 65 compliance, occupational allergies, and technical standards.





What is the Difference Between Type 1 and Type 2 Hard Hats?

All industrial protective hard hats are either Type 1 or Type 2 based on ANSI and CSA standards for impact resistance and direction. A hard hat can only have one designation for impact properties. There is no in-between according to these standards.

WHAT IS THE ANSI STANDARD?

The American National Standard for Industrial Head Protection, ANSI Z89.1-2014, provides industrial hard hat performance and testing requirements, and establishes types and classes of protective helmets to provide employers with hard hat options that provide appropriate protection for hazards present in a given workplace.

WHAT IS A TYPE 1 HARD HAT?

Type 1 hard hats based on ANSI and CSA standards are designed to reduce force as a result of an impact to ONLY the top of the head.

There are four specific performance requirements for Type 1 hard hats:

Flammability

No flame can be visible for five seconds after removing the test flame from the hard hat surface.

Force transmission

A single hard hat must not transmit force to the test head form exceeding 1,000 pounds of force. Conditioned hard hats (hot, cold, and ambient) shall be averaged, and the average cannot exceed 850 pounds of force to the test head form.

Apex penetration

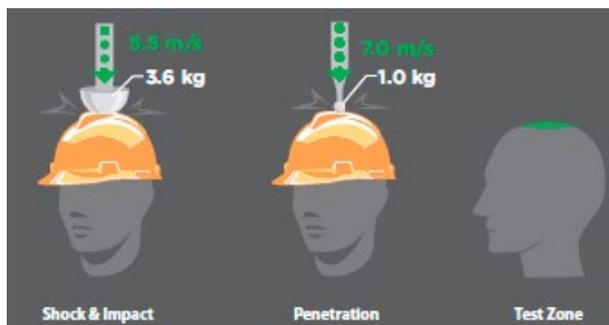
The penetrator cannot make contact with the top of the head form.

Electrical classification (Class G, Class E, or Class C)

Class G and Class E hard hats must meet appropriate performance requirements:

- Class G to withstand 2,200 volts for one minute. Maximum leakage shall not exceed three milliamperes.
- Class E to withstand 20,000 volts for three minutes after impact. Maximum leakage shall not exceed nine milliamperes.

Class C hard hats are not tested for electrical insulation.



WHAT IS A TYPE 2 HARD HAT?

Type 2 hard hats based on ANSI and CSA standards are designed to reduce force as a result of an impact to the front, back, sides, AND top of the head.

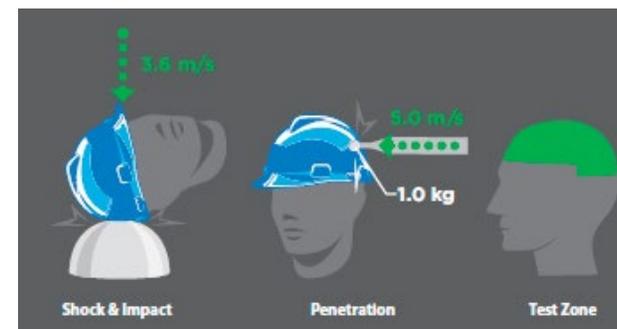
In addition to the four performance requirements of a Type 1 hard hat, Type 2 performance contains three additional requirements:

Impact energy attenuation

Hard hat is dropped onto a spherical object at various angles around the hard hat, above a designated test line.

Off-center penetration

A penetrator is dropped vertically, and the hard hat is rotated at different angles above a designated test line. The penetrator cannot contact the head form.



Chinstrap retention (optional)

If a Type 2 hard hat is provided with a chin strap, chin strap must be tested for retention, must remain attached to the hard hat and must not stretch beyond one inch in length.

WHAT OPTIONS ARE AVAILABLE FOR TYPE 1 AND TYPE 2 HARD HATS?

Solutions are available from MSA in both Type 1 and Type 2 hard hats. [Download this guide](#) for quick reference about Type 1 and Type 2 hard hats, and [visit this page](#) to see the full line of head protection from MSA. ■



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What to Look for When Inspecting Your Fall Safety PPE

By Rick Pedley, Contributor

OSHA specifies that fall safety PPE needs to be inspected before each use and at least annually by a competent, well-trained person who knows exactly what to look for.

Before you use your equipment for the day, inspect for damaged or defective gear and immediately remove it from service. Gear that has already been used in a fall should be properly discarded afterwards. An example would be cutting the webbing on a harness and

removing hooks on lanyards. It's helpful to think of fall protection equipment as a system of several smaller parts rather than a single whole piece. If any one of the individual components of the system isn't working, the entire system is compromised.

Consider the five following problem areas before you put your gear on to determine whether it's time to discard and replace it.

IMPACT INDICATORS

The visual impact indicator is one of the most straightforward features of fall safety harnesses and lanyards, which makes it one of the first things you should inspect. The impact indicators will appear when a force of 450-650 lbs. has been applied. Once deployed, impact indicators cannot be repaired or re-set.

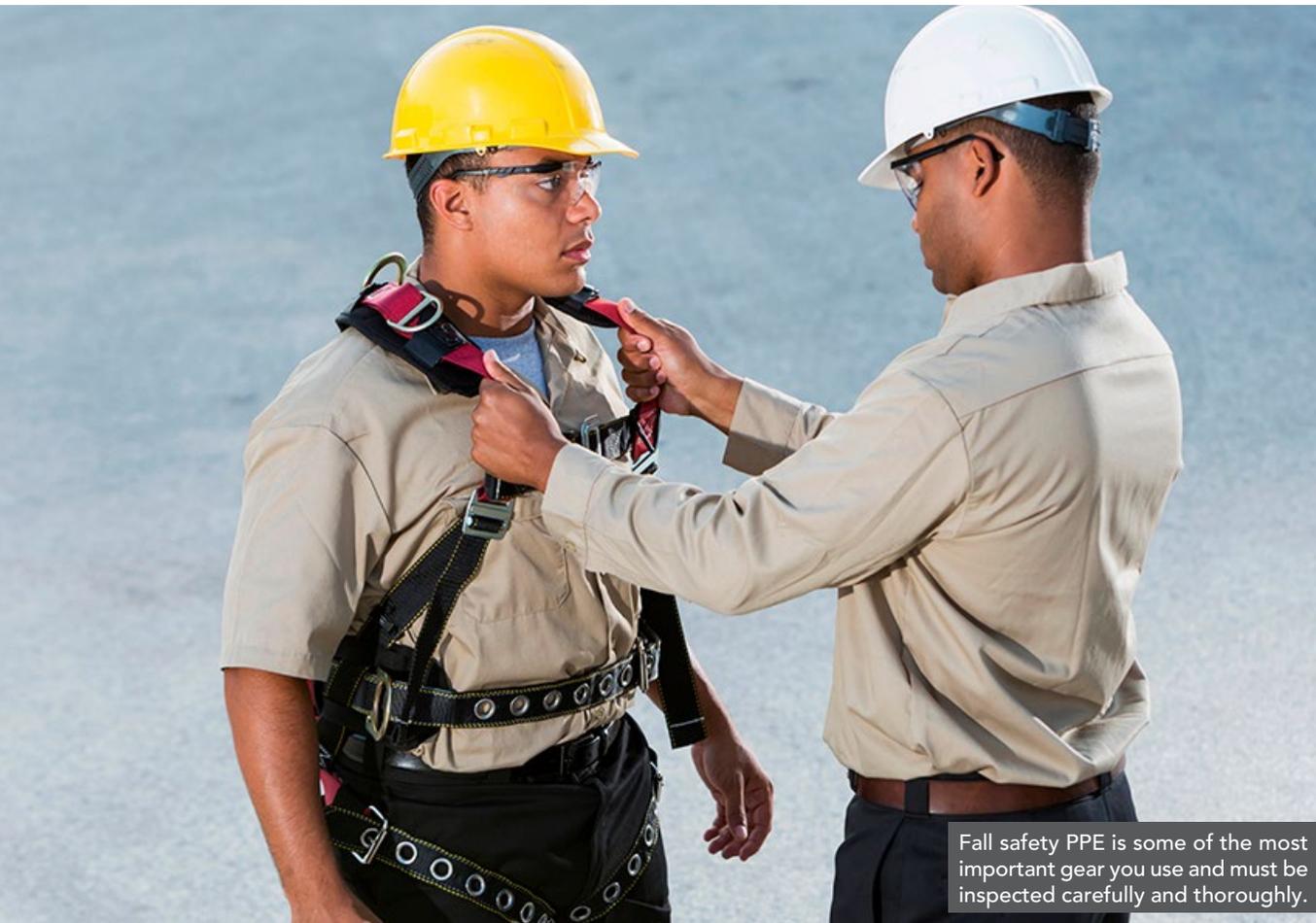
There are typically two types of impact indicators found on harnesses. The first is incorporated into the harness D-ring. After a fall, the visual impact indicator is deployed, and the D-ring is retained within the harness webbing. The second is folded and stitched in the harness webbing. After a fall, the stitches tear and the webbing unfolds. Remove the harness from service, even if the rest of it looks fine.

TAGGING AND LABELING SYSTEMS

Hopefully, you reviewed the guidelines from the manufacturer when you first got your equipment – potentially even before purchasing it – but inspections are a great time to brush up on the particulars and ensure you really know them. Losing the instruction isn't an excuse to avoid inspections because many manufacturers will have them readily available for download on their websites. In addition to these instructions, the fall protection harness itself must have a tag or label on it with the following information:

- Identification for the harness itself
- Model
- Date of manufacture
- Manufacturer's name
- Equipment limitations
- Warnings

If this tag is illegible or missing, the gear should be removed from service immediately. The label contains too much useful and relevant information to risk using



Fall safety PPE is some of the most important gear you use and must be inspected carefully and thoroughly.

equipment that might be past its service life or otherwise compromised. If the fall safety PPE looks fine but is past its service life according to the manufacturer, it needs to be discarded and replaced.

WEBBING AND STITCHING

Closely inspect the webbing, stitching, and other fibers on your fall safety gear that includes harnesses and lanyards. Grab the fibers in your hands and bend them to check both sides for damage and cuts—just looking at them won't reveal this kind of damage; they must be handled. Look for these signs of damage as well:

- Cuts
- Broken fibers
- Deterioration
- Modifications
- Fraying
- Uneven thickness
- Hard or shiny spots
- Missing, pulled, or cut stitches
- Hard, shiny, or discolored stitches

You should pay particular attention to areas that see a lot of friction, such as places where D-rings rub against the webbing or stitches and eventually lead to fraying or abrasion.

METAL HARDWARE

This will include buckles, grommets, D-rings, and other metal components on the harness and fall protection system. The D-rings should pivot freely. Buckles need to connect and adjust properly. Ensure that these parts are free from damage, alterations, or contamination. This contamination can take a few different forms:

- Deep rust
- Corrosion
- Sharp edges
- Cracks
- Wear
- Deformation

Any amount of damage is suspect when it comes to fall protection PPE. Even if the rust doesn't look particularly extensive, there could be more severe, underlying damage beneath it. At a minimum, this equipment should be set aside where it can't be mistakenly used.

CLEANLINESS AND STORAGE

Spot-cleaning your fall safety gear is as simple as using a damp sponge to wipe off surface dirt. You can use water and mild detergent for deeper dirt and dry it with a clean cloth. Ensure you hang it up to dry fully away from excessive heat, steam, or sunlight. Your storage should be as neat as possible and in a clean, dry, dark, and cool area. Avoid storing your equipment in areas with fumes, direct UV light, sunlight, corrosive materials, or batteries. Storage areas should also be free from dust, dirt, and oils that could degrade the equipment.

WHAT TO DO WITH UNUSABLE PPE

It's better to be safe than sorry, especially when it comes to fall safety and prevention. If there's anything suspicious about your fall safety harness and PPE, it should be discarded and replaced immediately.

Safety harnesses and lanyards cannot be repaired once they've been involved in a fall or become damaged, so do not try to make repairs. Avoid leaving any damaged

fall safety PPE where it can be mistakenly used or stored with working gear again. Cutting the straps off harnesses and hooks and connectors off lanyards will render them unusable.

PPE of all kinds can only protect the person wearing it when it's in optimal working order, used properly, and cared for. Equipment that is worn out or damaged has already performed its job and can't be trusted to protect you or anyone else ever again. At the same time, some types of retractable lifelines can be removed from service temporarily and sent back to the manufacturer or authorized service and repair center for new internal components prior to testing and return. However, you shouldn't take for granted that your equipment can be repaired in this way without looking into it, and you absolutely should not attempt to undertake those repairs in-house.

Taking care of your equipment, performing the required inspections, and doing checks before you work each shift make the difference between whether you can go home the day of an accident. Thorough inspections help you mitigate the risk of injury and death. With all of these tips, plus the guidance your manufacturer and dealer can provide, you can ensure that your equipment is ready for your next job.

Rick Pedley is President and CEO, PK Safety (pksafety.com). ■



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What the ANSI/ASSP Z359.11 Standard Means for Full Body Harnesses

By Scott Fowler, Content Specialist at American Society of Safety Professionals

Full body harnesses are critical elements of effective fall protection systems. Workers must understand how to properly wear and use full body harnesses when operating at height. A properly fitted and properly worn full body harness can help prevent serious injury or death when used correctly on the job.

The [ANSI/ASSP Z359.11-2021](#) standard establishes requirements for the performance, design, marking, qualification, instruction, training, test methods, inspection, use, maintenance and removal from service of full body harnesses.

Z359.11 defines a full body harness as “a body support designed to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest and shoulders.”

The 2021 update to Z359.11 includes revisions and new requirements, including:

- A modified, headfirst, dynamic test procedure
- New stretch-out requirements for frontal connections
- Alternative fall arrest indicator testing and new label requirements
- Allowance for harnesses with integrated energy absorbers
- Changes to labeling requirements

In addition, Z359.11 now requires harness label packs to have pictograms showing the approved usage of different connections and diagrams explaining the difference between deployed and non-deployed visual load indicators.



Harnesses can also now be ANSI compliant when they have an integral (permanently attached) energy absorber on the back D-ring. The revisions to test procedures improve the safety of lab workers and allow for innovation in design for harnesses that use frontal connections.

If you use full body harnesses on your work sites, it's helpful to remember the two Fs — function and fit. These two elements are essential to ensuring that workers have the right harness for their task and that the harness fits them properly.

Specific full body harnesses are designed for different working environments. For example, confined space harnesses should be designed and constructed so that, in the event of a rescue, the rescue subject is securely held and suspended during the rescue process. Harnesses used in welding operations are different, with back D-rings serving as the main fall arrest attachment points. You may want to partner with harness manufacturers to find the right harnesses for your applications.

Once you have the appropriate harnesses for your work applications, you must ensure that those harnesses fit



workers properly. Issues can arise from improperly fitted harnesses and create hazards.

If a harness is not worn properly, webbing could cinch up in the event of a fall and cause bodily harm. Harnesses that aren't properly adjusted can cause the webbing to loosen, making the user uncomfortable and causing personal fall limiters or self-retracting devices to fall further down a user's back.

Listen to the American Society of Safety Professional's [The Case for Safety Podcast](#) to learn more about the Z359.11 standard and full body harnesses from subject matter experts with the Z359 Standards Committee. For complete information on A10 Construction and Demolition standards and Z359 Fall Protection and Fall Restraint standards, visit assp.org/standards ■

TO KEEP CONSTRUCTION WORKERS SAFE, **YOU NEED THE RIGHT TOOLS.**

Working at height is hazardous and a leading cause of injuries in the construction industry. Our resources can help you address this challenge by understanding how to properly design, implement and use fall protection systems.



Learn the components of an effective Fall Protection Plan through webinars, articles and podcasts with industry experts.



Gain the knowledge you need to advance your safety programs with Online Instructor-led or Self-paced Courses.



Download your free copy of The Fall Protection Code, a detailed overview of the Z359 Fall Protection and Fall Restraint Standards.

Access Fall Protection Resources at
assp.us/fallprotection



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As Originally Seen in the July/August Issue of Industrial Hygiene in the Workplace

HISTORY/BACKGROUND

On a warm, summer day in July, a 42-year-old man was on his way to work for his new job as a roofer. When he arrived, there was plenty of water, ice and drinks available at the site for him to hydrate throughout the day. It was only his third day on the job, and he got straight to work. The high temperature was about 86°F and a relative humidity of 57%, for a heat index of 90°F. Later that afternoon, the man told his colleagues he wasn't feeling well. He climbed down from the roof and sat out of the sun. When his co-workers checked on him a few minutes later, he had developed symptoms of heat stroke. He was taken to nearby hospital where he died shortly after. (See OSHA's case studies link, below.)

Cases like the one above demonstrate why the new Outdoor and Indoor Heat-Related Hazards standard and the National Emphasis Program (NEP) are so important to keeping workers safe. The NEP protects employees from heat-related hazards and the

OSHA's National Emphasis Program – Outdoor & Indoor Heat-Related Hazards

resulting injuries and illnesses in outdoor and indoor workplaces. The standard expands on the agency's ongoing heat-related illness prevention initiative and campaign by setting forth targeted enforcement components and reiterating its compliance assistance and outreach efforts. This tactic is intended to urge early interventions by employers to prevent illnesses and deaths among workers during high heat conditions, such as working outdoors in a local area experiencing a heat wave. Early prevention measures include implementing water, rest, shade, training and acclimatization procedures for new/returning employees.

WHY THE STANDARD MATTERS

Millions of American workers are subjected to heat in their work environment and, even though illness from heat exposure is preventable, every year thousands become sick from occupational heat exposure. And, as noted in the above case study, some exposures can be fatal. According to OSHA, "Most outdoor fatalities, 50-70%, occur in the first few days of working in warm or hot environments, because the body needs to build a tolerance to the heat gradually over time." This process is called heat acclimatization, and the lack of acclimatization represents a major risk factor for fatal outcomes.

Occupational risk factors for heat illness include heavy physical activity; warm or hot environmental conditions; lack of acclimatization; and wearing clothing that holds in body heat.

Hazardous heat exposure can occur indoors or outdoors—and during any season, if the conditions are right—not only during heat waves.

Some outdoor industries where workers have suffered heat-related illnesses include:

- Agriculture
- Construction—road, roofing and other outdoor work
- Landscaping
- Mail and package delivery
- Oil and gas well operation

And, some indoor industries where workers have suffered heat-related illnesses include:

- Bakeries, kitchens and laundries (businesses with heat-generating appliances)
- Electrical utilities (boiler rooms)
- Fire service
- Iron/steel mills and foundries
- Manufacturing with hot local heat sources, like furnaces (i.e., paper products and concrete)
- Warehousing

KEY COMPLIANCE REQUIREMENTS:

All industries that could potentially deal with heat-related illnesses and conditions should note the following:

- Compliance safety and health officers (CSHOs), who are investigating for other purposes, shall open or refer a heat-related inspection for any hazardous heat conditions observed, or where an employee brings a heat-related hazard(s) to the attention of the CSHO (such as, employees or temporary workers being exposed to high-temperature conditions without adequate training, acclimatization, or access to water, rest and shade).
- When the weather is hot or a heat alert is issued for an area where the WHD, (Wage

and Hour Division) is investigating, the WHD is encouraged to coordinate with OSHA by providing information on heat-related hazards.

- CSHOs should inquire during inspections regarding the existence of any heat-related hazard prevention programs on heat priority days. A heat priority day follows when the heat index for the day is anticipated to be 80°F or more.
- Programmed inspections could occur on any day that the NWS (National Weather Service) has announced a heat warning or advisory for the local area. ■

Resources

For more information about how to properly access high temperatures in correlation with safe working practices, visit: <https://www.osha.gov/heat-exposure/hazards>

For Employers Adminstrating Heat Illness Prevention Training, read: https://www.osha.gov/sites/default/files/osha_heattraining_guide_0411.pdf

For Specifics on planning and supervision, visit: <https://www.osha.gov/heat-exposure/planning>

To read up on more case studies, visit: <https://www.osha.gov/heat-exposure/case-studies>

For general heat exposure guidelines, visit: <https://www.osha.gov/heat-exposure>





Self-Retracting Lifelines 101: Everything You Need To Know About SRLs and PFLs

When working at heights, selecting the proper fall protection may be the difference between getting the job done safely or a preventable tragedy. Due to the complexity of fall hazards, there is no one size fits all answer to protecting workers.

This article will answer some of your biggest questions about two of today's most commonly used fall protection components, the Self-Retracting Lifeline (SRL) and the Personal Fall Limiter (PFL).

HOW DO SRLS AND PFLS WORK?

SRLs and PFLs essentially work the same; they connect the user's harness to an anchor point and consist of a retractable web or cable lanyard and work like the seatbelt in a car.



During a fall, a braking mechanism engages, and an energy absorbing mechanism slows, then stops the line over a short distance, preventing further falling while reducing the impact force on the user's body.

WHAT IS THE DIFFERENCE BETWEEN AN SRL AND PFL?

PFLs are generally a more compact, lightweight version of a self-retracting lifeline. They connect directly to the D-ring of a body harness and provide working lengths from 6 to 9 feet.

SRLs are generally larger and heavier than PFLs, connect directly to an anchor point, and provide longer user working lengths.

WHAT IS CONSIDERED A LEADING EDGE?

OSHA defines a leading edge as "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."¹

Due to the nature of the work, installing a guardrail around the edge of a surface under construction may not be feasible. However, workers must wear fall protection when approaching the unprotected "leading edge."

Leading edge work adds additional elements of risk that users must be aware of when selecting fall protection:

1. If a worker falls over the leading edge, the sharp edge can sever a lifeline on impact or from the worker swinging back and forth.
2. The anchorage for leading edge applications is usually (though not always) below D-ring level,



often at foot level, because there is not always an overhead, approved attachment point, such as a wall or ceiling joist, and the lower anchor point does not interfere with a worker's arm movement.

That's why only Class 2 SRLs, per the latest ANSI Z359.14 updates, specifically designed and approved for a leading edge must be used.

WHEN TO USE WEB VS. CABLE SRLS?

Stainless and galvanized steel cable SRLs are well-suited for harsh environments. Their durability allows them to withstand more of the cuts and scrapes you find in specific industries. Class 2 steel cable SRLs also work for leading edge applications.

Nylon and polyester web SRLs are well-suited for work in sensitive areas where you would not want a steel cable rubbing against valuable or sensitive equipment. They are also preferable when working around electricity because the webbing is non-conductive. Finally, they are much lighter than cable options making them easier to carry on your back or transport.

HOW MSA SIMPLIFIES SRL AND PFL SELECTION

The new V-SERIES® line of SRLs from MSA simplifies on-the-job fall protection selection. To learn more about how MSA helps make fall protection selection safer, faster, and easier, check out the V-SERIES line of SRLs [here](#).

¹ <https://www.osha.gov/sites/default/files/publications/OSHA3146.pdf>



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WE KNOW WHAT'S AT STAKE.

What Is Rotational Motion?

Many Aren't Aware of the Common Cause of Concussions, a Significant Workplace Safety Threat

By Peter Halldin and Sofia Hedenstierna, Contributors

Many of us are at risk of head injuries at work, but for the construction, industrial and manufacturing industries, the risks are far greater. In fact, according to the Centers for Disease Control and Prevention (CDC), the construction industry has the highest absolute number of both fatal and nonfatal traumatic brain injuries of any U.S. workplace. The same authority reports that, between 2003 and 2010 alone, a total of 2,210 construction workers died due to a traumatic brain injury, representing 25 % of all construction fatalities.

Although safety helmets and hard hats are mandatory – as the Occupational Safety and Health Administration (OSHA) requires hard hats and head protection when workers are at risk for head injuries – construction and industrial workers still face significant risks on the job. The main causes of traumatic brain injury, both fatal and non-fatal, are slips, trips and falls, and contact with objects and equipment.

One of the reasons these accidents may cause traumatic brain injuries is that when the head impacts the ground in connection with fall, or if a falling object glances the head, this likely occurs at an oblique angle. When your head hits something at an angle, it may expose your head to rotational motion. Conventional hard hats are designed to protect against injuries like skull fractures, caused by linear motion, but oftentimes are not developed to address rotational motion.

UNDERSTAND ROTATIONAL MOTION

Rotational motion is a combination of rotational energy (angular velocity) and rotational forces (angular acceleration) that may result from oblique impacts to the

head. As the rotational motion is transferred to the brain, it starts to rotate. If the rotation is large enough, this can cause shearing of the axons, the cable transmitters of neurons, in the brain.

During most impacts, both linear and rotational motions occur and can cause injury. However, there are some differences regarding the types of injuries the different motions could cause. While linear motions primarily cause focal injuries, such as fractures and contusions, rotational motion may lead to diffuse injuries



such as diffuse axonal injury and subdural hematoma^{1,2}. Additionally, it has been shown in both experiments and numerical computer simulations³ that the brain is more sensitive to rotational motion than linear motion when it comes to concussions. In other words, a concussion caused by rotation occurs at lower levels of energy than in cases of linear motion. This means that even seemingly light impacts can cause concussions when rotation is introduced.

PROTECT AGAINST ROTATIONAL MOTION

First of all, you should wear a helmet, and make sure that it fits comfortably and securely on your head. You should also consider a rotational motion mitigation system. Thanks to many years of research in the field of rotational motion, there are ways to add protection into a helmet to potentially help mitigate its effects.

For example, some rotational mitigating systems allow material in the helmet to move and slide relative to the head, with the intention to redirect rotational energy to linear energy and thereby help to reduce the rotational energy otherwise transmitted to the brain.

TODAY'S HELMETS & PPE

Historically, helmets were designed to protect the wearer's head from linear forces and most helmets available today protect against a linear impact at the crown, which is mirrored in the regulatory standards. The standard ANSI/ISEA Z89.1 requires five performance tests that must be met to assign a safety helmet its classification, including force transmission, impact

energy attenuation, apex penetration, flammability, and electrical insulation.

The force transmission tests, which determine whether a helmet can reduce the force of a linear impact from a falling object to the top of the wearer's head, are a stark reminder of the necessity to wear helmets on the job. Also, the additional impact energy attenuation test, necessary for an ANSI Z89.1 type 2 helmet assignment, tests the linear accelerations transmitted to the head, although the impacts are located on the side, front, and rear of the helmet.

Although angled or off-center impacts to the head are seen as common accident scenarios and proved to be able to cause brain injuries, the regulatory standards don't certify helmets regarding their ability to help mitigate against rotational motion from an angled or off-center impact. However, more and more standards in the sport and moto sectors, for example, are introducing testing of angled impacts, illustrating the importance of taking rotational motion and the harmful effect it can have on one's head into account.

WHY IT MATTERS

On the job, most traumatic head injuries that occur are not caused by a pure linear impact to the crown of the safety helmet. When objects fall or a person falls on an object, they typically strike the safety helmet from an angle or off-center. For example, if a brick falls on someone's head, it most likely will glance off scaffolding or a beam before hitting the safety helmet. Both falling

at an angle and an oblique strike to the head by a falling object create rotational motion.

Critical to keeping workers safe is increased awareness of the potential causes of traumatic brain injuries and rotational motion, as well as access to appropriate PPE equipment, including helmets. When it comes to PPE, the first and most important step is for workers to wear a helmet. In fact, a recent survey from PPE provider J.J. Keller Safegear found that 72% of respondents didn't wear PPE because they didn't want to, while 50% thought it wasn't necessary. Educating workers about the risk of rotational motion and traumatic brain injuries is an important step in increasing PPE usage.

The types of helmets being worn matters as well. Workers should ensure their helmets meet current safety standards. In addition, they can consider a helmet equipped with a rotational mitigating system, intended to help reduce rotational motion to the wearer's head during certain angled impacts.

As workers continue to face risks on the job, education around rotational motion and encouraging best practices around PPE and safety practices is critical to improve conditions. ■

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1 Gennarelli et al. (1987). "Directional dependence of axonal brain injury due to centroidal and non-centroidal acceleration," in Proceedings of the 31st Stapp Car Crash Conference (Warrendale, PA: Society of Automotive Engineers).

2 Gennarelli et al. (1972). "Pathophysiological responses to rotational and translational accelerations of the head," in Proceedings of the 16th Stapp Car Crash Conference, 1972 (Warrendale, PA: Society of Automotive Engineers).

3 Kleiven, S (2007). "Predictors for traumatic brain injuries evaluated through accident reconstructions," Stapp Car Crash J, vol. 51, pp. 81–114, Oct. 2007.

Jim Huebner, Construction Marketing Channel Manager Protective Industrial Products, Inc.



Q Explain what solutions your company offers in the construction industry?

PIP® offers a full portfolio of head-to-toe PPE, including:

- **Hand Protection** against cut, impact, crushing, cold and chemical exposure.
- **Hearing Protection** against prolonged exposure to machinery noise.
- **Eye Protection** against debris.
- **Hard Hats and Safety Helmets** protection against falling objects and struck-by hazards.
- **Respiratory Protection** against silica dust.
- **Protective Clothing and Footwear** protection against the elements.
- **Electronic Flares** provide visible barriers between workers and heavy machinery.

- **Tool Tethering** prevents objects dropping from heights.

Q Do you have any new products for the construction industry that came out this year or will be coming out soon?

This year PIP® launched the Traverse™ Safety Helmet featuring Mips® (Multi-Directional Impact Protection) Technology and Zenon Ultra-Lyte™ safety glasses with select styles featuring the Fogless® 3Sixty™ coating for eye protection. For protective clothing, PIP® recently introduced a comprehensive line of Bisley® premium high-vis multi-season workwear, designed to get the job done with styles for both men and women. In the near future PIP® will launch THORZT hydration for heat stress protection.

Q What three things do you want people to know about your solutions/company in the construction space?

PIP® has the most extensive offering of type I and type II head protection in the market, including the new Traverse™ safety helmet.

With North American manufacturing facilities for head, hearing and hand protection, PIP® ensures a vital supply chain and better product availability.

PIP® has a complete Heat Stress solutions offering, which will include THORZT Hydration, engineered with the right mix of vitamins, minerals, and amino acids to provide workers with a replenishing beverage.

“Statistics from Science Direct show that close to 60 percent of recorded head injuries are caused by slips, trips and falls,” says Jim Huebner, marketing channel manager, Construction. “Science tells us that concussions and traumatic brain injuries (TBIs) are primarily the result of rotational force and strain to the brain. Why is this an interesting scientific finding? Simply put, it goes against how standard hard hats have been tested in the past.

“Typical ANSI/ISEA Z89.1 testing on Type I and Type II head protection involves top and side of head impacts. This method does an excellent job assessing the effectiveness of vertical and linear impact resistance but does not properly address protection against rotational impacts to the head.”

To address this, PIP has come out with the new Traverse™ Safety Helmet featuring MIPS® (Multi-Directional Impact Protection System) Technology. This safety helmet meets both the ANSI/ ISEA Z89.1 Type II and EN12492 impact protection.

Its lightweight ABS/Polycarbonate shell and integrated 4-point chin strap ensure a comfortable and secure fit – even in the event of a slip, trip or fall – eliminating the chance of the safety helmet dislodging if gravity should take over.

The integrated MIPS technology acts as a low-friction layer inside the safety helmet between the padding and the EPS foam protective layer that allows for a multi-directional movement of 10-15mm on certain angled impacts. This slight movement allows the shell of the safety helmet to slide in whichever direction the rotational impact comes from while the suspension stays secure, ultimately helping limit the rotational movement to a worker’s head.

Q What is unique about your product that helps keep construction workers safe?

Safety helmets with Mips® Technology feature a low friction layer designed to help reduce the severity of head injuries, such as concussions and traumatic brain injuries that are commonly the result of rotational force and strain to the brain. Injury statistics demonstrate workers are more likely to fall at an angle, not directly on top of the head due to the forward energy of motion that may extend to the head when hitting a hard surface.

Q Compared to your competitors, what makes your product safer/better for construction workers?

Our Traverse™ Safety Helmets meet both the ANSI/ISEA Z89.1 Type II standard and the shock absorbing

capacity, retention system strength and effectiveness of the retention system clauses under the EN 12492 standard. The Traverse is also equipped with Mips® Technology to protect against rotational impacts to the head with a low-friction layer inside the safety helmet.

Thorzt Hydration replenishes essential vitamins and minerals to hydrate workers more efficiently than water without added sugar.

Q How are construction workers using your products to stay safe?

PIP® designs products focused on fit, comfort and style. When PPE fits well and is comfortable, workers feel good wearing it and are more likely to wear it all day. From lightweight above the neck protection like the

Traverse™ Safety Helmet and Ultra-Lyte™ safety glasses to protective clothing like Bisley® workwear designed for both men and women and a comprehensive offering of hand protection that keeps workers safe and compliant. ■

Watch the **MIPS x PIP** video at <https://www.youtube.com/watch?v=DCEiEXInL5k>.





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