Industrial Safety & Hygiene News

ISHN

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INSIDE this eBOOK:

Exclusive research:
Construction Industry Safety

- Forklift safety
- Employee turnover risks
- Fall protection
- Handling construction emergencies

Construction INDUSTRY SAFETY

ALL *NEW* CONTENT

Volume 2

introduction

In 2017 the construction industry is one of the most dynamic sectors of the U.S. economy. Residential construction, bridge erection, roadway paving, excavations, demolitions, and large scale painting jobs are all booming.

Health and safety issues are among the top challenges facing the industry in 2017, according to the State of Construction Management Report www.notevault.com. Health and safety is a daily challenge for construction business owners, general contractors, superintendents, and subcontractors. In fact, 80 percent of all construction industry respondents to the management report say safety is their number one business priority – tops among all priorities (such as cost savings, project management and efficiency).

In 2015 the U.S. construction industry employed 9.5 million workers. These workers engage in many jobs that may expose them to serious hazards, such as falling from rooftops, unguarded machinery, being struck by heavy construction equipment, electrocutions, silica dust, and asbestos.

Consider these facts:

- One in ten construction workers are injured every year, according to OSHA
- The construction industry is #2 in the United States for fatal injuries in workers younger than 18, according to the U.S. National Library of Medicine
- Sixty percent of construction workplace injuries occur within the employee's first year of employment, according to the U.S. Bureau of Labor Statistics
- Falls are the greatest cause of fatal construction injuries, according to the Center for Construction Research and Training

In this *ISHN* ebook we offer you articles on fall protection equipment and training, accident prevention strategies, research, motor vehicle safety, and profiles of OSHA construction-related standards: the new silica rule, ladders, welding and respiratory protection.

I'm sure you'll find *ISHN's* Safety in Construction ebook to be an asset in addressing construction's array of risks, ensuring regulatory compliance, and preventing serious injuries and fatalities.

Dave Johnson - *ISHN* Editor

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SPONSORED CONTENT

Health of construction activity *reflected in safety budgets and staffing*

Few pros report any cuts coming in 2017

By DAVE JOHNSON, *ISHN* EDITOR

Construction work poses numerous serious challenges to safety and health professionals, but what are the top concerns?

According to an exclusive survey of construction safety pros conducted for *ISHN* by BNP Media's Market Research Division in March, 2017, 75 percent of respondents said their number one safety challenge is training workers on the proper use of equipment.

Compliance with OSHA regs came in at number two, cited by 71 percent. Putting safety on equal footing with other operations and a shortage of skilled labor was cited by 63 percent. Discipline is a challenge for 58 percent; making new technology work for safety and health applications challenges 54 percent; and regular inspection of personal protective equipment (PPE) is a concern of 50 percent of respondents.

Hazards

What construction site hazards concern safety and health pros the most? According to the research:

- Slips, trips and falls / maintaining good housekeeping – 75 percent
- Working at heights – 63 percent
- Employee lifestyle health issues – 54 percent
- Hand and arm injuries – 50 percent
- Working with cranes, hoists, and other material handling equipment – 46 percent
- Ergonomic/musculoskeletal injuries – 44 percent
- Confined spaces – 42 percent
- Eye and face injuries – 40 percent
- Noise – 40 percent

Goals for 2017

The top safety and health goals for construction industry safety pros in 2017 align with the most common hazards. According to the survey, these are the priority objectives:

- Safety training of employees – 88 percent
- Building and/or maintaining a safety culture for your organization – 77 percent

Health of construction activity *reflected in safety budgets and staffing* *continued*

- Employee safety and health engagement/participation/accountability – 67 percent
- Senior leadership safety/health engagement and accountability – 54 percent
- Building/maintaining a behavior-based safety program – 44 percent
- Reducing serious injuries and fatalities – 44 percent

PPE use

PPE is a common sight in construction. In fact, the construction industry is one of the heaviest consumers of PPE. According to the research, this is the prevalence of PPE usage:

- Eye and face protection – 94 percent
- Head protection – 92 percent
- Fall protection – 90 percent
- Hearing protection – 88 percent
- Hand protection – 83 percent
- Foot protection – 79 percent
- Respiratory protection – 65 percent
- Welding protection – 52 percent

In addition to PPE, safety pros in 2017 will be purchasing high-visibility clothing (86 percent); first aid kits (96 percent); safety signage (84 percent); heat stress prevention products (73 percent); confined space monitors (54 percent); construction safety tech apps (70 percent); and safety lighting (56 percent).

Budgets & staffing

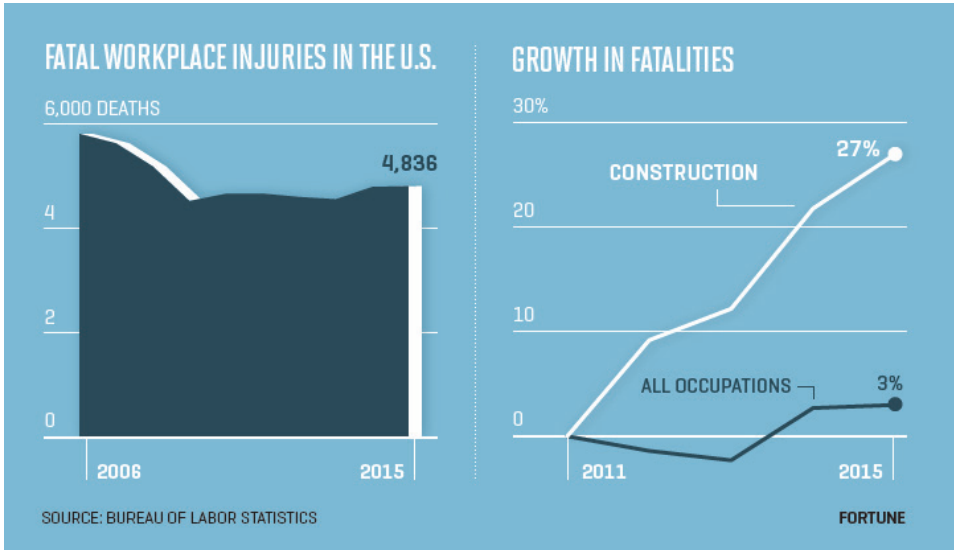
It's not surprising that safety and health resources in 2017 will increase for 46 percent of surveyed pros, compared to 2016, given the growth dynamics in the industry. Fifty percent report resources will remain flat with 2016 levels, and only four percent report resources this year being cut.

It's easier to add budget dollars than headcount in many industries, and construction is no exception. According to the research, 54 percent of safety pros expect the number of safety and health employees to remain the same in 2017; 38 percent expect the number to increase this year. As with budgets, cuts will be rare. Only six percent report staff levels will decline this year.

Are safety pros ready

For construction boom's impact?

Projected growth in the US construction industry is soaring. Fueled by improving labor market with young families and college graduates looking for first time home purchases, as well as baby-boomers looking to down size, residential construction has now reached $450 billion in 2016 and is projected to reach over $500 billion by 2019. Our improving overall economy, along with sector growth in manufacturing, lodging, office, and recreational construction are all strongly impacting construction demand. The 2017 ConExpo-Con/Agg Expo held in March achieved a 16% attendance growth with over 128,000 attendees. "There was an element of confidence and pent-up demand at the show", said Dave Foster, VP Volvo CE. This pent-up demand will create sales growth for safety gear.



While positive economic news is great, one must question if safety professionals are prepared for the impact increased demand will have on construction workers. As a whole, the US work place is continuing to reduce fatal injuries. However, the construction industry is experiencing significant growth in fatalities. As per the Bureau of Labor Statistics, fatalities in the construction industry grew by 27% during 2011-2015.

In addition, industry statistics annually endorse over 1,000,000 hand injuries, 700,000 eye injuries, and 500,000 emergency room visits related to burns, caustic, and corrosive exposures that could be garment related. Safety professionals can overcome many of the industry's injuries by becoming better educated and more aware of the technological advancements impacting safety gear.

Safety gear providers can meet this new challenge by educating and demonstrating products that best equip today's workforce. For example, the 9672DT2 Diamond Tech 2 is one of the coolest and most comfortable cut resistant options available today. The glove transforms DSM Dyneema® Diamond Tech filament yarn into a featherweight glove utilizing an 18 gauge shell. The 9672DT2

MCR Safety continued

scores an ANSI cut level 2, comes in light blue, with a gray polyurethane (PU) palm and forefinger coating, sizes XS-XXL. In the past, as much as 70% of hand injuries occurred due to people not wearing gloves, likely do to comfort. Workers today can perform job tasks by wearing ultra-thin cut resistant gloves, such as the 9672DT2 Diamond Tech 2, improving grip, reducing fatigue, and improving overall worker productivity.

For protective eyewear, fogging of safety glasses commonly leads to workers removing their eyewear and ultimately exposing them to workplace hazards. Advances within anti-fogging technologies today provide solutions that prevent removal of safety glasses. Max6® anti-fog coating is proven to provide six time's greater fog-resistance and dissipation over traditional coatings. The Dominator™ 4 series glasses feature co-injected TPR wire core adjustable nose pads for complete adjustability. The Dominator™ 4 is available in 2 frame options; Black and Champagne. The Dominator™ 4 glasses meet or exceed Z87+ and Military High Velocity Impact standards.

From T-shirts to high performance garments, construction workers today have a multitude of more user-friendly garment offerings. For example, T-shirts today are now incorporating wicking properties for comfort and breathability. Plus, black shading in high wear areas are making shirts more fashionably recognizable.

Within high performance gear, easy to distinguish arc ratings, visible to the wearer and others, help guide consumers in making educated decisions with regard to proper safety levels. An example of high performance gear is our Big Jake BJ38JH which is a flame resistant jacket made of PVC / Nomex material that will keep you dry and safe from certain thermal hazards. It features a sturdy zipper front, oversized attached adjustable drawstring hood, adjustable hook and loop wrist closures, two front patch pockets and a cape vented back with D-Ring access. The fluorescent lime background material and two inch silver reflective stripes meet ANSI 107 Class 3 requirements for high visibility protection. It also meets the ASTM F1891 Standard Specification for Arc and Flame Resistant Rainwear. The BJ38JH achieves an HRC2 / CAT2 rating with an Arc Thermal Performance Value (ATPV) of 8.9 cal/cm2.

BIG JAKE® CAT2

MCR Safety has over forty years of experience as a leader in the field of personal protective equipment (PPE). Our assortment of offerings includes gloves, glasses, and garments that are made from the highest quality materials available to ensure maximum safety, comfort, and style. Take advantage of our 360° PPE Protection Analysis Program to educate new technologies and our Buy & Try program to expedite product evaluations. https://shop.mcrsafety.com/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SAFETY

Sustained pressure

Kneeling on hard surfaces increases risk of injury

By MEGAN TANSOM

The largest joints in our body are complex ones where the three main bones of the leg (femur, tibia, and fibula) meet and are protected by the kneecap (patella). Large ligaments hold each knee together, and tendons attached to the bones allow muscles to extend and flex the lower leg. Cartilage lubricates the movement of the bones.

Static stresses

Knees can be temporarily or permanently damaged by dynamic, athletic actions such as a twist or a fall, but static stresses can also lead to disability. Sustained pressure on the cartilage or cushioning bursa fluid sacs can be painful, especially when paired with osteoarthritis or other ailments associated with aging or overuse. Concentration of pressure on a small part of the knee, such as kneeling or pressing against hard surfaces, can be distracting enough to interfere with a worker's concentration and productivity.

Carpet layers, masons, baggage handlers, tile setters, carpenters, and other trades do plenty of hard work at or near ground level. In some positions, knees support a majority of body weight in a very different way than while standing. These workers don't want to be distracted by pain, discomfort or concerns about long-term problems.

"Tasks that involve frequent stooping, kneeling, or squatting increase your risk of developing bursitis, tendinitis, or arthritis in the knee. The risk of arthritis increases for workers who already have had a knee injury and work in these positions."[1]

"In a national survey of working adults (age 33-41), the incidence of musculoskeletal disorders including knee injuries was found to be linked to the hazardous job activity of kneeling or crouching."[2]

Knee pads should cradle and support all the bones, cartilage, tendons, and ligaments in knees. High-quality knee pads conform to the shape of the knee as they move and change position. Old-school knee pads provided a slightly softer surface to kneel on, but still there is concentrated pressure on limited areas. Shaped knee pads, with foam lining, gel sheets, or injected gel materials, surround the knee joint, conform to and cradle it, and most importantly, stabilize it when pressure is applied. The padding is designed to distribute pressure across the entire knee area, and absorb some of the impact associated with moving around, shifting weight when changing positions or "walking" on your knees.

"Workers who spend a good deal of time in the kneeling position put 89 percent of their body weight on a small surface area. Prolonged kneeling can often lead to injury. The rationale for using knee pads is to protect the knee by distributing your weight over a larger surface area and reduce the force passed on to soft tissue."[3]

Sustained pressure *continued*

Increasing productivity

For simple or short-term tasks, a pair of inexpensive foam knee pads might suffice. Beyond the padding, pro-grade knee pads usually incorporate some type of protective shell, analogous to the sole of a shoe. And like shoes, one type of sole may not be best for all situations.

A basic function of the shell is to protect against hard or sharp objects, such as rocks, nails, debris, or even bumps in the floor. Depending on the surface, desirable attributes may include traction or slip-resistance (roofers); water- or chemical-resistance (custodians and cleaning crews); or non-marring materials (tile installers and finish carpenters). Some workers may prefer smooth, easy-sliding shells that allow them to scoot around or across certain work surfaces without crawling.

"Reducing discomfort associated with kneeling on hard surfaces for prolonged periods may increase productivity because workers would presumably be able to work for longer periods without standing up."[3]

> "WORKERS WHO SPEND A GOOD DEAL OF TIME IN THE KNEELING POSITION PUT 89 PERCENT OF THEIR BODY WEIGHT ON A SMALL SURFACE AREA."

More options

New generations of knee pads also offer more choices on how they attach to the worker's knee and leg – a common source of user complaints. Straps that are too tight or feel funny can restrict circulation and cause other problems. Whether hook-and-loop fasteners, buckles, elastic straps, etc. are used, knee pads should fit the task and the worker. Worn all day, or in challenging conditions, they need to be secure, and may need to fit over cold weather or other types of protective clothing. For intermittent use, the straps should be easy on/easy off. For folks on the go, the straps may need to articulate for easy walking as well as kneeling. A variety of styles are available to choose from well-stocked vendors.

Knee pads stay with the worker wherever they go: they are essentially portable personal padding/protective equipment (PPPPE!). But sometimes, they just don't work in a specific

Sustained pressure *continued*

situation or are not what workers prefer. It may be possible to pad the kneeling surface instead of the knees. This would be analogous to walking without shoes on deep carpet.

Kneeling pads are typically thick, padded accessories that workers take with them. Often small and portable for controlling localized pressure, they can also be used to cushion elbows, shoulders, hips, and other body parts when working in tight, constrained, or twisted postures. Larger versions can be used to provide whole-body support, and are comparable to anti-fatigue mats for feet and legs. They can be staged near areas where regularly used and shared by a number of employees who work there.

Modern surgical techniques, reflexology, and a variety of drugs are available to help treat knee pain when it starts to interfere with work. Take a long-term, preventative approach so workers can work more comfortably and stay pain-free and productive by finding the right knee pads that suit workers and their respective tasks.

Megan Tansom is Senior Product Specialist at Ergodyne.

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HAND PROTECTION: *Are Those Numbers Right?*

Traditionally when it comes to cut protection, two numbers reign supreme: Cut Score and Cost. Everyone desires the highest cut score for the lowest cost. Many people inherently believe that if they have the highest cut score, they are the safest and if they can get it for pennies, they are winning across the board.

FALSE!

Unfortunately, there are short cuts to "achieve" those numbers. A few years ago, cheap manufacturers discovered, under old ANSI 105 and EN 388 testing, that if they added enough glass content to their yarn they could attain high cut scores and a very cheap glove due to the low cost of glass. During testing of these gloves, the glass content would dull the blade which would then cause skewed test results.

However, by misleading the lab and workers, a new safety hazard was created : skin irritation. Glass is inherently stiff and is susceptible to fibrillation when it is repeatedly flexed.. Once fibrillated, the residue could splinter and penetrate the wearer's skin. This causes a burning sensation in the wearer's hand and irritates the skin. The worker then would be more prone to go bare handed which would leave them exposed to cut hazards, defeating the whole purpose of the glove itself.

Thankfully, respectable manufacturers are creating new blended yarns made from safe fibers such as HPPE (High Performance Polyethylene), Kevlar and Graphene that offer cut resistance, durability and are not associated with skin irritations. DSM Dyneema® and DuPont® Kevlar® are setting the standard in developing these new technologies. Manufacturers who are recognized licensees of DSM Dyneema® and DuPont® Kevlar® promote these technologies, as well as their own brand of technologies, such as G-Tek PolyKor® HPPE and G-Tek Suprene™ graphene yarns as alternative value added brands.

PROTECTIVE INDUSTRIAL PRODUCTS

COATINGS

Coatings are extremely important to your safety. If you think about it, a liner is your last line of defense as it's the last contact with the sharp object before it has the chance to reach your skin. The coating of the glove is your first line of PPE defense as your hands are handling and controlling the object. If you lose your grip, the cut risk hazard increases and you are then relying on the liner.

Here are some quick basics on coatings:

- Nitrile is tough and will resist oils and oil-based solvents.
- Latex will do well with water and acetone type solvents.
- Polyurethane is thinner and best for handling small parts in most conditions.

When entering a construction site there is so much going on that one glove just can't do it all. One thing we can be sure

HAND PROTECTION: *Are Those Numbers Right?*

continued

of however, is that sharp dangers are everywhere so a cut resistant glove is absolutely imperative.

To help you simplify your choice we offer this simple guide:

- Heavy duty work, such as handling and installing rebar or fasteners, requires tough latex coated gloves that will enhance grip in dry and wet conditions and offer great resistance against tear and puncture.
- Electrical and HVAC tasks call for polyurethane coated gloves as an economical choice. However, nitrile coated gloves, such as the ATG Maxiflex Cut 34-8743, offer better performance but at a higher cost.
- Masonry work will need tough nitrile coated gloves that can take the abrasion caused by the rough edges of brick
- Tiling and window installations require a latex coated glove with a high cut resistant liner. This offers both good slip resistance and cut protection.
- Plumbing and carpentry work necessitates a good solid grip and nitrile coatings will do the job.
- Studding and drywall installation obliges high cut resistance with the combined tough grip of nitrile, or the precision grip of polyurethane.

To help with finding the proper glove, Protective Industrial Products has created a Selector Guide to help you match with the proper glove for the task at hand. http://us.pipglobal.com/en/selector-guides/cut-protection/

When in doubt about the proper glove to use, contact a Safety Specialist to perform an on-site safety assessment.

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Know your fall protection

Training and reading equipment instructions can save lives

By MARTY SHARP

Year after year, falls continue to hold the dubious distinction of the most frequent cause of fatalities at construction sites. Simultaneously the number of OSHA citations issued annually for fall arrest violations remains at or near the top of the list. "OSHA's $100,000 Club of Safety Citations" is a report issued regularly. From September 1, 2011 through February of this year 11 companies were cited for violations involving fall protection. Proposed penalties range from $589,200 to $102,300. Companies cited were from a cross section of industries including steel erection, masonry contractor, construction, general contractor, warehouse, retail, food processor and shipyard/boat repair.

A deputy director of NIOSH said "Falls kill; they are the top cause of construction fatalities accounting for one-third of on-the-job deaths in the industry."

Why do falls continue to kill?

The question that remains unanswered is, "Why do we continue to see these disappointing and miserable results" in spite of a host of well-intentioned initiatives? Fall Protection manufacturers; contractors/employers and workers all share the responsibility. Reliable equipment in the hands of trained personnel is a big part of the solution. "Reliable equipment" is our responsibility as manufacturers. While training and selecting the right equipment for the task is basically the job of the employer, we can, and should help.

All residential construction companies must comply with 29CFR Part 1926.501 (b)(13). – Check out SR1441:

(13) Residential construction. Each employee engaged in residential construction activities 6 feet (1.8 m) or more above lower levels shall be protected by guardrail

Know your fall protection *continued*

systems, safety net system, or personal fall arrest system unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Since roofers have been required to use fall protection for a relatively short time, this is new to them and some of them are very unfamiliar with the products and their appropriate applications. Roofers normally tie-off at the peak of the roof and have a fall hazard that will involve a foot level drop over a sharp edge. Not all equipment is approved for this application. However, the instructions for the product they purchase often end up unread on the ground.

"Did you read our instructions?"

Recently I had a large customer who has a huge facility that was built in the 1950s. It required a lot of roof repair and they hired some high quality sub-contractors to do the work for them. A worker was in the situation where he was on a corrugated roof that gave way. He was in a harness hooked to a retractable. However, as he fell through the roof he cut the cable on the retractable, fell through the structure to the floor and was seriously injured. This being a large corporation with their own legal team they went into action against the manufacturer. The manufacturer said, "Did you read our instructions?" The attorneys not being familiar with fall protection said, "why?"

After receiving a copy of the instructions, they were shocked to find out the unit was not designed for foot level drops or sharp edges. The wrong equipment had been selected. There was not much they could do in this situation. Now they realized that if another accident occurred and a fatality resulted they could be drawn into a manslaughter case. They began to search for a retractable that was approved for their application. They learned my product line was approved, but asked me to perform a series of tests to verify it. The test was extreme; they wanted a worst-case scenario. They asked that a 282-pound rigid test weight be dropped five feet over a flamed cut piece of steel. The edge was very jagged and sharp; the five feet was chosen to simulate a six-foot-tall man standing at the edge of a roof where his D-ring would be approximately 60 inches above the deck. I put a wooden pallet on the ground because I didn't want to crack my cement, and even I didn't think this was going to work. I used six wire rope retractables and six web retractables for the test.

To my surprise, I didn't have to use the pallet. The difference was the internal mechanism of the retractable. The units contain a mechanical shock absorber. Instead of hitting the edge of the flame cut steel, the wire and the web are allowed to slide over the edge instead of stopping and cutting like an ax.

Some retractables on the market that lock up quickly offer a shock absorber that can be attached at the tie-off point.

Know your fall protection *continued*

Instead of the wire deploying from the retractable, the whole retractable moves allowing the line, of the retractable to slide over the sharp edge. Both systems are effective.

The problem is the workers are often unaware of the after-market part and don't install it. Reading the instructions would solve this problem. I personally prefer a retractable that is self-contained. Some retractable instructions state that you must set railing or perimeters wire or guard rail around the entire structure to avoid the fall; in that case why even use a retractable.

Conclusion

Not being proactive or lacking concern could draw you into negligence and even "manslaughter" in extreme cases. Make reading instructions of components a top priority.

Marty Sharp is president of Arizona Wire & Rope and Ultra-Safe Inc. In the industry for more than 25 years, he is a respected hands-on fall protection leader. Ultra-Safe Inc. services include planning and training. Call 800-850-5914 or email marty@ultrasafeusa.com.

Elevate your understanding

Know the difference between scissor and aerial lifts to prevent serious hazards

By JENNIFER STROSCHEIN

Scissor lifts and aerial lifts have replaced ladders and scaffolding in many general industry workplaces due to their mobility and flexibility in allowing workers to perform certain job tasks. Using this equipment poses serious hazards which OSHA says can and does lead to worker injuries and death. in one year, the agency reports it found ten preventable fatalities and more than 20 preventable injuries resulting from a variety of incidents involving scissor lifts alone.

> "THE USE OF BOTH SCISSOR AND AERIAL LIFTS INHERENTLY PRESENTS FALL HAZARDS TO WORKERS."

OSHA says that falls are among the most serious hazards associated with scissor and aerial lift use. Unfortunately, there are no general industry standards that specifically address this issue, but OSHA does provide guidance in various Letters of Interpretation (LOIs), publications, and the construction standards. Employers can elevate their understanding of scissor and aerial lift fall protection by thoroughly reviewing this information.

Scissor vs. aerial lifts

There are numerous types of "lifts" used in industry, and it can be confusing for employers. Per OSHA, a scissor lift is a mobile scaffold for which the platform only moves vertically. An aerial lift is any vehicle-mounted work platform that can move vertically and/or horizontally. Some aerial lifts can even rotate around a vertical axis.

Aerial lifts are used to lift workers to difficult work positions that aren't able to be accessed by other equipment, even scissor lifts. This is also why aerial lifts are extremely hazardous. Lifting a worker up and out can make the lift extremely unstable if not operated correctly.

The use of both scissor and aerial lifts inherently presents fall hazards to workers. As such, understanding the basic difference between each helps ensure that you're implementing the correct safety measures in your workplace. This is particularly critical regarding fall protection.

General fall protection

OSHA says that employers should ensure that workers adhere to the following general fall protection measures when utilizing scissor and aerial lifts:

- Ensure that guardrails conforming to the requirements of 1910.23(e) are present and in good repair.
- Close access gates or openings.
- Stand firmly on the floor of the bucket or work platform.
- Do not climb or lean over guardrails or handrails.

Elevate your understanding *continued*

- Keep work within easy reach to avoid leaning away from the lift.
- Do not use planks, ladders, or other devices as a working position.

Personal fall protection

OSHA addresses the use of personal fall protection on scissor and aerials lifts in several LOIs. The protection is different for each lift. The reason for this is because the design and function of a scissor lift is different from that of an aerial lift, thus posing varying degrees of risk for falls.

Scissor lifts

In an August 2000 LOI, OSHA says that a scissor lift is a type of scaffold. In this letter, the agency states that if the scissor lift has guardrails that meet OSHA requirements, then this is all that is required for fall protection. In other words, workers do not have to be tied-off if the scissor lift has a properly designed and maintained guardrail system. The guardrails themselves serve as the necessary fall protection.

Aerial lifts

Fall protection for aerial lifts is different. OSHA's general industry aerial lift standard at 1910.67(c)(2)(v) requires that a body belt be worn and a lanyard attached to the boom or basket at all times to prevent an employee from falling out, or being bounced out of the aerial lift. Body belts are only allowed for fall restraint and fall positioning systems as a means of fall prevention. A full body harness is required for fall protection.

Belting off to an adjacent pole, structure, or equipment when working from an aerial lift is not allowed per 1910.67(c)(2)(iii). This does not, however, prohibit employees from exiting or entering an aerial lift basket that rests on or adjacent to an elevated surface. In these instances, the Agency says that fall protection requirements apply as explained in a May 3, 2001 LOI.

Elevate your understanding *continued*

OSHA requires fall protection at four feet above a lower level at 1910.23(c). A worker may enter or exit an aerial lift (at heights above four feet) provided that fall protection such as guardrails or a fall arrest system is used while the worker moves between the lift and the working surface.

Conclusion

Despite OSHA's effort to educate employers, scissor lifts and aerial lifts continue to present a number of safety challenges, especially falls. Although there are many factors that contribute to falls, most injuries are the result of falls to a lower level that many times involve equipment, including scissor and aerial lifts. Fortunately, you can safely guard against this hazard by understanding scissor and aerial lift fall protection and implementing the required safeguards.

Jennifer Stroschein is an Editor — Workplace Safety with J. J. Keller & Associates, Inc., Neenah, Wis.; (800) 558-5011; www.jjkeller.com.

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PlugStation Earplug Dispensers – With the PlugStation, you can afford to put earplugs in all the places they're needed – workstations, outside the restrooms and in the break room. Easy, convenient access to hearing protection will help ensure that the earplugs are being used and will save time. Available in corded and non-corded versions.

Dura-Mesh – All Moldex disposable masks feature the exclusive Dura-Mesh shell which resists collapsing, even in heat and humidity, resulting in a more comfortable mask and less usage for increased cost-savings.

HandyStrap and SmartStrap – Both the HandyStrap and SmartStrap allow a mask to hang from the user's neck when not in use, so masks are not easily discarded or misplaced resulting in fewer masks used.

Economical Design – The 7000 Series half mask and 9000 Series full face feature unique design innovations that minimizes parts reducing maintenance time and cost.

Qualified users can arrange a free trial at www.moldex.com/ISHN

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Compliance challenges of OSHA's new SILICA STANDARD

By DAVE JOHNSON, *ISHN* EDITOR

Am I covered by the rule?

Approximately 676,000 workplaces will be affected, including sites in construction and general industry and maritime. About 2.3 million workers are exposed to respirable crystalline silica in their workplaces. The majority of these workers, about 2 million, work in construction.

About 295,000 workers are exposed to respirable crystalline silica in more than 75,000 general industry and maritime workplaces. Exposure to respirable crystalline silica can cause silicosis, lung cancer, other respiratory diseases, and kidney disease.

OSHA estimates that more than 100,000 workers in general industry and maritime are exposed to silica levels that exceed the new permissible exposure limit (PEL).

The main industries affected are: construction, glass manufacturing, pottery products, structural clay products, concrete products, foundries, dental labs, paintings and coatings, jewelry production, refractory products, landscaping, ready-mix concrete, cut stone and stone products, abrasive blasting, refractory furnace installation and repair, railroads, hydraulic fracturing for oil and gas, and asphalt products manufacturing.

What is the new permissible exposure limit (PEL) for respirable crystalline silica (RCS)?

The PEL limits worker exposures to 50 micrograms of respirable crystalline silica per cubic meter of air (µg/m3), averaged over an eight-hour day. This level is the same for all workplaces covered by the standard (general industry/ maritime and construction), and is roughly 50 percent of the previous PEL for general industry, and roughly 20 percent of the previous PEL for construction and shipyards.

Compliance challenges of OSHA's new SILICA STANDARD *continued*

How do I control silica exposures to below the PEL?

Employers must use engineering controls and work practices as the primary way keep exposures at or below the PEL.

Engineering controls include wetting down work operations or using local exhaust ventilation (such as vacuums) to keep silica-containing dust out of the air and out of workers' lungs. Another control method is enclosing an operation ("process isolation").

Examples of work practices to control silica exposures include wetting down dust before sweeping it up or using the water flow rate recommended by the manufacturer for a tool with water controls.

Respirators are only allowed when engineering and work practice controls cannot maintain exposures at or below the PEL.

For construction, the standard includes Table 1, a list of common construction tasks along with exposure control methods and work practices that work well for those tasks and can be used to comply with the requirements of the standard.

Why can't my workers exposed to silica dust above the PEL simply wear respirators?

Respirators are not as protective as engineering controls, states OSHA, and they aren't always as practical. Unless respirators are selected for each worker, individually fitted and periodically refitted, and regularly maintained, and unless filters and other parts are replaced as necessary, workers will continue to be exposed to silica.

In many cases, workers using only respirators would also have to wear more extensive and expensive protection. Even when respirators are selected, fitted, and maintained correctly, they must be worn consistently and correctly by workers to be effective. Respirators can also be uncomfortable, especially in hot weather, and cannot be used by some workers, states OSHA.

What are the compliance deadlines for the new rule?

For all operations in general industry and maritime, other than hydraulic fracturing operations in the oil and gas industry:

- Employers are required to comply with all obligations of the standard, with the exception of the action level trigger for medical surveillance, by June 23, 2018.
- Employers are required to offer medical examinations to employees exposed above the PEL for 30 or more days a year beginning on June 23, 2018.
- Employers are required to offer medical examinations to employees exposed at or above the action level for 30 or more days a year beginning on June 23, 2020.

Compliance challenges of OSHA's new SILICA STANDARD *continued*

For hydraulic fracturing operations in the oil and gas industry:

- Employers are required to comply with all obligations of the standard, except for engineering controls and the action level trigger for medical surveillance, by June 23, 2018.
- Employers are required to comply with requirements for engineering controls to limit exposures to the new PEL by June 23, 2021. From June 23, 2018 through June 23, 2021, employers can continue to have employees wear respirators if their exposures exceed the PEL.
- Employers are required to offer medical examinations to employees exposed above the PEL for 30 or more days beginning on June 23, 2018.
- Employers are required to offer medical examinations to employees exposed at or above the action level for 30 or more days a year beginning on June 23, 2020.

In the construction industry, employers are required to comply with all obligations of the standard (except methods of sample analysis) by June 23, 2017. Employers are required to comply with methods of sample analysis by June 23, 2018.

What are the specific compliance requirements if I am in general industry?

- You must measure the amount of silica that your workers are exposed to -- if it may be at or above ***an action level of 25 µg/m3*** (micrograms of silica per cubic meter of air), averaged over an 8-hour day.
- All workers exposed to respirable crystalline silica above the ***permissible exposure limit of 50 µg/m3, averaged over an eight-hour day*** must be protected.
- You must designate ***"regulated areas"*** – work zones that must be identified by posted signs to limit workers' access to areas where they could be exposed above the PEL.
- ***Dust controls*** must be used to protect workers from silica exposures above the PEL.
- When dust controls cannot limit exposures to the PEL you must provide ***respirators*** to workers.
- Restrict ***housekeeping*** practices that expose workers to silica where feasible alternatives are available;
- You must have a ***written exposure control plan*** that identifies tasks that involve exposure and the methods you use to protect workers.
- ***Medical exams*** — including chest X-rays and lung function tests — must be provided every three years for workers exposed at or above the action level for 30 or more days per year.
- ***Train*** workers on work operations that result in silica exposure and ways to limit exposure.
- You must ***keep records*** of workers' silica exposure and medical exams.

Compliance challenges of OSHA's new SILICA STANDARD continued

How does the hazard communication standard play into the silica rule?

- You must include respirable crystalline silica in your program to comply with the hazard communication standard (HCS) (***29 CFR 1910.1200***). You must ensure that each employee has access to labels on containers of crystalline silica and safety data sheets, and is trained in accordance with the provisions of HCS and the silica standard. At minimum the following hazards must be addressed in training: Cancer, lung effects, immune system effects, and kidney effects.

What other training topics must be covered?

You must ensure that each employee covered by silica standard training provisions can demonstrate knowledge and understanding of at least the following:

- The health hazards associated with exposure to respirable crystalline silica;
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica;
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;
- The contents of the training section; and
- The purpose and a description of the medical surveillance program required by paragraph (i) of this section.

How does the respiratory protection standard play into the silica rule?

- When respiratory protection is required by the silica standard, you must provide each employee an appropriate respirator that complies with the requirements the standard and ***29 CFR 1910.134 –*** OSHA's respiratory protection standard. Respiratory protection is required:
- When exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls;
- Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible;
- During tasks for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL; and
- During periods when the employee is in a regulated area.When respirator use is required by this section, you must establish a respiratory protection program in accordance with ***29 CFR 1910.134***.

Compliance challenges of OSHA's new SILICA STANDARD *continued*

What topics must be included in my written exposure control plan?

Your written exposure control plan must contain at least the following elements:

- A description of the tasks in the workplace that involve exposure to respirable crystalline silica;
- A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task; and
- A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica.

You need to review and evaluate the effectiveness of your written exposure control plan at least annually and update it as necessary.

You must make your written exposure control plan available for examination and copying, upon request, to each employee covered by this section, their designated representatives, and OSHA.

How do I conduct an exposure assessment to determine if I am covered by the silica standard?

You must assess the exposure of each of your employees who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level.

You can use the "***Performance option***" -- assessing the eight-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.

You can choose the "***Scheduled monitoring option***" -- perform initial monitoring to assess the eight-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, in each work area. Where several employees perform the same tasks on the same shift and in the same work area, you can sample a representative fraction of these employees in order to meet this requirement. In *representative sampling*, you must sample the employee(s) who are expected to have the highest exposure to respirable crystalline silica.

If initial monitoring indicates that your employee exposures are below the action level, you can discontinue monitoring for those employees.

If the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the PEL, you need to repeat monitoring within six months of the most recent monitoring.

If the most recent exposure monitoring indicates employee exposures are above the PEL, you must repeat monitoring

Compliance challenges of OSHA's new SILICA STANDARD *continued*

within three months of the most recent monitoring.

If the most recent (non-initial) exposure monitoring indicates employee exposures are below the action level, you must repeat monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time you can discontinue monitoring for those employees whose exposures are represented by monitoring, except as otherwise provided in paragraph (d)(4) of the standard.

Reassessment of exposure: You need to reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when you have any reason to believe that new or additional exposures at or above the action level have occurred.

Methods of sample analysis: You must ensure that all samples taken to satisfy monitoring requirements are evaluated by a laboratory that analyzes air samples for respirable crystalline silica in accordance with the procedures in Appendix A.

Employee notification of assessment results: Within 15 working days after completing an exposure assessment, you must individually notify each affected employee in writing of the results of that assessment or post the results in a location accessible to all affected employees.

Whenever an exposure assessment indicates employee exposure is above the PEL, you must describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

How does the silica rule for construction (1926.1153) differ from the silica rule for general industry (1910.1053)?

The construction silica standard includes ***Table 1***, which specifies exposure control methods when working with materials containing crystalline silica, such as the use of stationary masonry saws, handheld power saws, walk-behind saws, jackhammers, walk-behind milling machines and floor grinders, crushing machines, and heavy equipment and utility vehicles used to abrade or fracture silica-containing materials, or used during demolition work involving silica-containing materials.

The construction rule requires the designation of a competent person, which the general industry rule does not. ***Competent person*** means an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. The competent person must have the knowledge and ability

Compliance challenges of OSHA's new SILICA STANDARD *continued*

necessary to fulfill the responsibilities set forth in the standard.

The construction standard does not apply where exposures will remain low under any foreseeable conditions; for example, when only performing tasks such as mixing mortar; pouring concrete footers, slab foundation and foundation walls; and removing concrete formwork.

The construction rule does not contain the requirement for a "regulated area" nor posting of warning signs at all entrances to regulated areas.

What are my air monitoring recordkeeping duties?

You must maintain an accurate record of all exposure measurements taken to assess employee exposure to respirable crystalline silica.

This record must include at least the following information: the date of measurement for each sample taken; the task monitored; sampling and analytical methods used; number, duration, and results of samples taken; identity of the laboratory that performed the analysis; type of personal protective equipment, such as respirators, worn by the employees monitored; and name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

Compliance challenges

ISHN asked OSHA attorneys, consultants and industrial hygienists about compliance challenges:

1. ***Changing conditions:*** Construction sites can pose challenges for an employer conducting an initial assessment or ongoing monitoring of air levels of respirable crystalline silica because the nature of the worksite, and activity on the worksite, is always changing.
2. ***Multiple employers:*** Construction often involves many different employers co-located on a site. This will make it difficult for one employer to take measurements or to implement abatement efforts when it is more difficult to anticipate changes in the worksite that will be created by other employers.
3. ***Requirement to perform air sampling:*** Since employers must make a positive initial determination of "how much" employees are exposed to silica to make a determination of which portions of the silica standard applies,

Compliance challenges of OSHA's new **SILICA STANDARD** *continued*

they will be doing an abundance of sampling. They will be spending lots of extra money on the services and operations will almost certainly be impacted.

4. ***Evaluations of proper control strategy:*** The control of silica exposures in construction will dictate the use of respiratory protection at even lower levels, and require the employer to re-evaluate control strategies using the classic "hierarchy of controls." Will OSHA enforcement demand that employers perform expensive studies to justify the use of PPE vs. engineering controls such as substitution of other balst media?
5. ***Medical surveillance:*** Employers must provide comprehensive medical examinations for employees who wear respiratory protection for more than 30 days/year. These will be expensive and may impact operations. How will employers deal with employees who are found to have medical issues – especially those that will have a medical exam for perhaps the first time?
6. ***Need for IH savvy:*** "With the exception of using an impinger with liquid media, silica sampling with a cyclone probably requires the most industrial hygiene savvy and skills," says an IH. "It looks easy but there are a lot of ways to screw up sampling results. One wrong tip of the grit pot and the whole sample is ruined, for example."
7. ***Short duration exposures:*** A worker cuts bricks for a few minutes, does other non-silica work for a couple hours, then comes back to cut brick for a few more minutes. Good IH knowledge is needed to collect enough silica for lab analysis above the limit of detection while not overloading the filter with non-silica dust.
8. ***Lab fees:*** Silica samples may cost 5-10 times more than an asbestos or lead sample. Lab fees can escalate quickly if sampling is not well thought out.
9. ***Interpreting results in construction:*** This may be difficult because of the variability in jobs and also person-to-person. Cutting a brick upwind or downwind makes a big difference in results. How many days of silica sampling are needed before

Compliance challenges of OSHA's new **SILICA STANDARD** *continued*

the big picture of results is truly known? A CIH may request many days. People paying the bills want a broad interpretation of results ASAP. To compound the problem, people don't like paying an IH to stand around watching one pump suck in dust. So they request that several pumps be up and running at the same time. When an IH runs around just to check on pump calibration and such, this lessens observation time needed for upwind/downwind and a host of other worker activities and job conditions. Factors for results in these cases are uncertain. People paying bills win out while the IH includes a disclaimer in reports that results are only applicable for observed conditions and day(s) of sampling.

10. ***Control strategies:*** Water in mist or flow is often a control solution for silica dust, but construction sites don't like stray water on sites because of electrical hazards and housekeeping. Dust collection by vacuum appears good until someone has to empty the dust collection bag where they create a cloud of dust. One IH says he has seen this oversight happen many times.
11. ***Use of respirators:*** Until engineering controls for silica at construction sites become common, respirators will be the choice for quick fix. Many of construction workers will not like wearing a respirator and will like it less when told to maintain the respirator properly. Expect to see respirators once briefly used to be tossed atop the nearest bench or in a toolbox uncovered, which is an OSHA violation to maintain respirators in a sanitary condition.
12. ***Silica is everywhere:*** The silica issue is more complex than most air contaminants because the Earth is made largely of silica and exposure is very widespread. Operations that drill, make structures, dig, etc. are going to face those challenges, and may not understand or care about whether they are in compliance, according to one IH consultant.

Compliance challenges of OSHA's new SILICA STANDARD *continued*

What are the health risks?

A worker's chance of becoming ill from exposure to silica dust depends on the tasks performed, the amount of dust they are exposed to, and the frequency of the exposures. Each exposure to silica adds into the total load of silica in the lungs.

Health professionals express the total silica dose one person accumulates over time as "mg/m3 years," usually calculated as an average exposure each year in mg/m3 multiplied by the number of years with that exposure, or by an estimated average for each year. As the total dose increases, so does the likelihood, or the risk, for developing silicosis, lung cancer, or chronic obstructive pulmonary disease (COPD). Some workers become ill after many years of low exposure levels, while other workers who perform less frequent but high exposure tasks can become ill with a lower cumulative exposure. Why? Because a high exposure to silica dust overwhelms the lungs' defenses and most of the dust particles settle deep into the lungs where they do the most damage.

Researchers have developed estimates of the total dose likely to cause disease. For example:

- Among granite workers in the U.S. the rate of death from silicosis doubled at a cumulative exposure of less than 1 mg/m3.
- A recent study of pottery workers found high rates of silicosis, up to 20 percent, among workers with an average exposure of 0.2 mg/m3 over many years.
- The likelihood of getting lung cancer from silica exposure follows a similar pattern, with a significant risk at levels around 0.2 mg/m3 over many years, or higher exposures in a shorter period of time.
- There is less information available to estimate the risk for COPD, but there is documentation showing that about 25 percent of cement masons, bricklayers, and plasterers have COPD after many years of work in the trade.

These very general estimates do not take into account individual susceptibility or other exposures at work that add onto the injury caused by silica and lead to disease at an earlier age.

Compliance challenges of OSHA's new **SILICA STANDARD** *continued*

It is important to remember that repeated exposures to silica add up to a total dose that can cause serious lung disease. The kinds of exposures seen in high exposure tasks, such as sandblasting and tuckpointing, over time can give a worker enough exposure to put him or her at serious risk for a silica-related illness.

Source: The Center for Construction Research & Training (CPWR)

What is silicosis?

There are three types of silicosis:

- Acute silicosis, which causes cough, weight loss, and fatigue within a few weeks or years of exposure to inhaled silica.
- Chronic silicosis, which appears 10 to 30 years after exposure and can affect upper lungs and sometimes cause extensive scarring.
- Accelerated silicosis, which occurs within 10 years of high-level exposure.

When people breathe silica dust, they inhale tiny particles of the mineral silica. This silica dust can cause fluid buildup and scar tissue in the lungs that cuts down your ability to breathe. Intense exposure to silica can cause disease within a year. But it usually takes at least 10 to 15 years of exposure before symptoms occur.

There is no specific treatment for silicosis. Removing the source of silica exposure is important to prevent the disease from getting worse. Supportive treatment includes cough medicine, bronchodilators, and oxygen if needed. Antibiotics are prescribed for respiratory infections as needed.

Treatment also includes limiting exposure to irritants and quitting smoking.

People with silicosis are at high risk of developing tuberculosis (TB). Silica is believed to interfere with the body's immune response to the bacteria that cause TB. Skin tests to check for exposure to TB should be done regularly. Those with a positive skin test should be treated with anti-TB drugs. Any change in the appearance of the chest x-ray may be a sign of TB.

People with severe silicosis may need to have a lung transplant.

Source: Medline Plus

Compliance challenges of OSHA's new SILICA STANDARD *continued*

First legal shots fired at OSHA's silica rule

A coalition of trade associations has filed a legal challenge against OSHA's final silica rule. Eight construction industry organizations filed the challenge to the rule in the U.S. Court of Appeals for the Fifth Circuit in New Orleans.

The National Association of Manufacturers (NAM) joined the American Foundry Society in filing a petition of their own in the Fifth Circuit.

"OSHA's silica regulation is based on flawed science, flawed economic data and flawed logic," Pete Ruane, president of the American Road & Transportation Builders Association in Washington, said in a statement. "The unintended consequence of the proposal is that it will actually expose road workers to greater risk by diverting resources."

While OSHA estimates the rule will cost the construction industry about $659 million per year, a March 2015 economic analysis conducted by Bethesda, Maryland-based Environomics Inc. showed it will cost the industry nearly $4.9 billion per year, with $3.9 billion attributable to direct compliance expenditures such additional equipment, monitoring and respirators and more than $1 billion in indirect costs such as higher prices for construction materials and building products.

The groups filing the petition are the Mississippi Road Builders' Association, American Subcontractors Association of Texas, Pelican Chapter of Associated Builders and Contractors, Louisiana Associated General Contractors, Associated Masonry Contractors of Texas, Distribution Contractors Association, Mechanical Contractors Associations of Texas and Texas Association of Builders, with their national organizations also joining the petition.

Big-time backing

National construction organizations such as the Associated Builders and Contractors (ABC) are backing their local state chapter organizations.

In a news release, the ABC said the construction industry raised numerous concerns when the rule was first

Compliance challenges of OSHA's new **SILICA STANDARD** *continued*

proposed, but the Labor Department failed to address a number of those issues when promulgating the final rule.

"In particular, the industry presented substantial evidence that OSHA's proposed permissible exposure limit (PEL) was technologically and economically infeasible," the group said. "The petitioning groups are concerned that the agency failed to take into account this evidence and moved forward with the same infeasible PEL in the final rule."

In addition to the ABC, national groups challenging the rule include the American Road and Transportation Builders Association, the American Subcontractors Association, the Associated General Contractors of America, the Mason Contractors Association of America, the Mechanical Contractors Association of America, and the National Association of Home Builders.

Keeping hands safe *throughout the job site*

Hand protection for the construction industry has come a long way since big, clumsy leather gloves were the only option.

In our user-driven world, we've developed specific glove styles to meet the unique needs of different types of construction jobs, workers and specialty contractors, and the hazards they face.

If you're thinking more about hand protection for your business, you're in good company. A 2016 study by ISHN showed 59% of construction safety professionals surveyed reported being challenged by hand and arm injuries. Also in 2016, an analysis of the North American hand protection market reported the construction industry starting out with low compliance – but adopting hand protection at an increasing rate, thanks to increased awareness of the cost of accidents.

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We've observed an uptick in the adoption of hand safety

Construction Gloves and their Primary Uses

ANSI CUT LEVEL	GLOVE CHARACTERISTICS	EXCAVATION	CONCRETE / REBAR		STEEL / STRUCTURE		ZIPPING UP			FINISHING	
		General	Concrete, Stone & Cinder Block	Tying Rebar	Crane Signaling	Iron Steel & Sheet Metal	Glass Handling	Electrical Work	Installing HVAC	Drywall	Laying Carpet
ANSI 5 Cut	**Heavy Duty Leather & Canvas Glove** High level protection against cuts, abrasions & hot metal surfaces	✓				✓					
ANSI 5 Cut	**10 g Knit with Textured Palm Coating** Great grip from a crinkle surface that won't leave prints on glass	✓	✓			✓	✓				
ANSI 5 Cut	**Split Leather Palm Defeats Cutting Oil & Grease** Outstanding grip, even for metal surfaces slick with cutting oil	✓	✓			✓	✓		✓		
ANSI 4 Cut	**Shake Off the Mess with a 3/4 Coated HPPE Knit** For wet work, choose a nitrile coating on a fine gauge knit for dexterity	✓	✓			✓					
ANSI 4 Cut	**Dexterity Even a Rodbuster Could Love** Fast hands need extreme dexterity & a glove that won't get in the way			✓		✓	✓				
ANSI 4 Cut	**Good Wet & Dry Grip Gloves** Light weight & high strength; designed for dexterity, fit & flexibility			✓		✓				✓	✓
ANSI 4 Cut	**High Visibility So Hands & Signals Get Noticed** Gloves to keep wearers & co-workers alert, fewer chances of accidents				✓		✓		✓	✓	✓
ANSI 4 Cut	**Versatile Whole Arm Protection** High-tech knit yields high protection in a thin, light weight sleeve					✓	✓	✓	✓		
ANSI 4 Cut	**Arc-Rated Arm Protection for Electricians** Cut resistant sleeve for running wire & installing circuit breakers					✓	✓	✓	✓		
ANSI 4 Cut	**Significant Dexterity in a Fine, Stretch Knit Glove** Comfortable, form-fitting cut knit, so fine you can pick up an O-ring						✓			✓	✓
ANSI 3 Cut	**Great Value in a Good, Basic Glove** Economical protection for job sites with a 100% gloves policy							✓	✓	✓	✓
ANSI 3 Cut	**New Solar Panel Cut Glove** Cool & comfortable glove designed at the request of a solar company						✓				

Keeping hands safe *throughout the job site*

continued

equipment – particularly cut protection – by construction professionals across the US. In fact, many companies served by Worldwide Protective Products have adopted a 100% gloves policy for work sites; often establishing a minimum cut protection level for all hands on site at ANSI level 3.

Finding the best match for the job

There are as many glove styles as there are roles on a construction site. To demonstrate, we've highlighted a number of steps and the pros who perform them with the features of our top construction gloves in a chart on the next page.

For example, workers tying rebar demand thin, light weight gloves with extraordinary dexterity to do their job at top speed. Their gloves feature palm coatings refined to ultra thinness. Meanwhile, crews handling sheet metal need gloves to grip surfaces that can be slick with cutting oil. And those gloves won't work for handling glass because they'll mark the surface. So we've designed a style for great grip without leaving prints.

Of course, safety managers will appreciate the innovations we've made in high tech, light weight yarns that increase cut resistance while decreasing product costs, making it easier to endorse a 100% gloves policy.

To take some of the complexity out of choosing cut resistant gloves and sleeves, take a look at the chart on the following page. If you're interested in seeing these products first hand, we'll be glad to provide samples. ***Just contact Al Williams at awilliams@wwprotective.com or call (877) 678-4568***

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Each job has its own unique safety needs, from excavation to tying rebar, pouring cement, pulling wire, installing HVAC and on. At Worldwide, we have hundreds of distinct styles to match each need.

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How to deal with construction emergencies

Guidelines for treating burns, bleeding, crushing injuries & fallls

By KATRINA McKINNON

The construction industry is one of the major employers; it also has a substantial percentage of workplace-related accidents. Imminent threats lurk from every corner and part of work. It is important to note that not only the workers themselves are exposed to risks -- the public can be in danger as well.

The majority of injuries in the construction sector happen from falls or falling objects or while using power tools and operating machinery. Hazardous materials such as lead paint, wood and cement dust, and solvents lead to respiratory and other health-related problems.

According to Safe Work Australia (SWA), this industry is the third most deadly in Australia in terms of fatality rate and ranked fifth in terms of causing serious injury.

With a safe work culture proven to save lives and money, here's a guide to some of the most common incidents and how to address them.

Making an assessment

Ever witnessed an accident or seen one on TV? What is the one thing you always notice? Yes - people flock towards the victim. At times, out of sheer curiosity or simply to post something that will become viral online. In most cases, people want to help.

As we go through the other points of this guideline, it is important to always start by clearing the area of unwanted people.

Immediately check if the danger or threat has been neutralized before engaging the victim. Remember, you can only extend your help if you are able. Keep your focus and stay sharp. If you are alone with the victim, reach out for your phone and call for help. It is unwise to leave a victim behind.

How to deal with construction emergencies

continued

Be ready with the following details when making an emergency call:

- A brief but relevant description of the accident
- The status of the patient
- Your exact location
- Your phone number

When other people are with you, it is best to have them meet the emergency team as they arrive.

Managing burns

After making sure that the source of the burn has been neutralized, it is imperative to make an assessment of the burn before taking further action.

There are three main types of burns: first, second, and third-degree. Each degree is based on the severity of damage to the skin, with first-degree being the most minor and third-degree being the most severe.

> "IMMEDIATELY CHECK IF THE DANGER OR THREAT HAS BEEN NEUTRALIZED BEFORE ENGAGING THE VICTIM."

First-degree burns: redness, minor inflammation and swelling, non-blistered skin

Second-degree burns: blisters, extremely red and sore, some thickening of the skin

Third-degree burns: widespread thickness with a waxy white color, char, raised and leathery texture

Contrary to popular belief, a burnt area of the skin should not be flushed with cold water. It is actually best to wash the area with clean running water. When the wound is cleaned, cover it with a non-adhesive, non-fluffy, wet dressing.

Chemical burns require sensitive care. As it can easily contaminate the different parts of the body, any clothing exposed to the chemical must immediately be removed before anything else. Seek further assistance by calling an emergency team if deemed necessary.

Handling bleeding

Always be extremely cautious when handling patients with an open wound. Keep in mind the several diseases that can be transmitted by an accidental infusion of blood.

Always wear a pair of gloves in treating bleeding victims regardless of the severity of the wound or cut. Examine the affected area for any foreign object; if there is one found, never attempt to remove or pull it out.

Keep the patient relaxed and seated comfortably. Clean the wound with antiseptic or clean running water. Bleeding can easily be slowed down by applying pressure on the affected area with a clean dressing while keeping it elevated and stationary.

How to deal with construction emergencies

continued

There are some cases, however, where serious bleeding can cause shock. If that happens, immediately dial the number for an ambulance.

What to do with crush injuries

Crush injuries happen when a part of the body, like an arm, leg, hand, or foot is squashed. Most of the time, the damage is not obvious on the outside while it heavily affects the muscles.

This type of injury is very common in a construction workplace. The most serious cases occur where heavy machinery is used.

Hastily remove the crushing weight of the victim with professional help. When it is safe to proceed, check for a response. If the victim is conscious, see to it that they stay that way.

Make an assessment of the injury, if there is bleeding, treat normally as stated above. In extreme cases, it is best to immediately seek for advanced medical help.

> "IT IS IMPORTANT TO ALWAYS START BY CLEARING THE AREA OF UNWANTED PEOPLE."

Fall injuries management

The most common accidents that occur at a construction site are falls. Should a person fall from more than a meter high, there is a great chance that the injury sustained may be already critical. This may lead to the head or spinal damage.

Do not move the victim immediately as it may aggravate the situation. Check:

- the victim's consciousness
- signs of confusion
- vision impairment
- nausea
- drowsiness

These are already symptoms of a concussion and will require immediate expert help.

For fractures, treat the wound and make sure that the affected part is restrained. Call the ambulance right away.

Documentation is key to keeping an organized workplace emergency plan. Take note of all the things that occurred, especially the details of how the situation was managed.

Having a first aid guide conspicuously posted on your office walls may actually save lives.

Here is a Construction First Aid Guide poster that you can download and print for your workplace.

Katrina McKinnon writes for Alsco Pty Ltd., 20 Bridge St, Pymble NSW 2073, Australia

Tel: 1300 659 892; www.alsco.com.au; www.alscofirstaid.com.au

How to deal with construction emergencies

continued

FIRST AID GUIDE

CONSTRUCTION FIRST AID

ALSCO First Aid

ALSCOFIRSTAID.COM.AU

1 Call for Help '000'

1. Check and neutralise hazards to yourself, bystanders and the victim.
2. Check for a response to see if the victim is conscious.
3. One person should stay with victim while another calls for help. If alone, stay with victim and use your phone to make the call.
4. When dialling emergency number, state you need an ambulance. Provide your phone number, incident description, condition of victim, and exact location.
5. Have someone meet emergency team outside your workplace.

2 Dealing with Burns

1. Neutralise hazards before attending to victim.
2. For chemical burns, wash affected area with cool running water for up to 20mins. Ensure water does not carry chemical to unaffected parts. Refer to Safety Data Sheet (SDS).
3. For other burns, flush the area with cool running water for up to 20 minutes.
4. Apply non-adhesive, non-fluffy, wet dressing to affected area.
5. If required, get medical assistance.

3 Dealing with Bleeding

1. Wear gloves.
2. Have the victim sit down and reassure them.
3. Carefully check the wound for foreign objects (do not remove). If severe, call for an ambulance.
4. Minimise bleeding by placing dressing over the wound and applying firm, direct pressure. Keep it elevated and immobilised.
5. Victim might go into shock, so treat accordingly and call for ambulance.
6. Lay the victim down and conserve their body heat. Reassure them and document the incident.

4 Dealing with Crush Injuries

1. Crush injuries result in damage to muscles and bones due to heavy objects. Toxins can also build up around injuries, causing complications.
2. Neutralise any hazards before attending to the victim.
3. Call emergency services and reassure the victim
4. Any crushing weight should be removed from the victim as soon as possible, provided it is safe to do so.
5. Check if victim has suffered any injuries and treat accordingly.
6. Be prepared to treat the victim for shock.
7. If in doubt about how long the person has been crushed, seek medical advice prior to moving the object.
8. Monitor the victim and document the incident.

5 Fall Injuries

1. Any fall greater than 1 meter should be treated as possible head or spinal injury. Stablise the head and neck and call emergency services.
2. Any head injury should be treated as possible concussion. Call emergency services or seek medical advice.
3. Confusion, vision impairment, nausea and drowsiness are some signs of concussion.
4. If the victim has suffered any fracture, instruct him to remain still, treat any wound, and then immobilise the part that was fractured. Call emergency services.

6 Dealing with Chemical Burns

1. Make sure that there is no danger to you before you respond.
2. Wear appropriate PPE.
3. Look for the Safety Data Sheet (SDS) of the chemical. Follow the instructions.
4. If burn injury was caused by chemicals, then it should be placed under cool running water for up to 20 minutes, repeat if necessary. No ice.
5. Make sure chemical does not reach unaffected areas.
6. Clothing that has been contaminated must be removed if it does not cling to the skin of affected area.
7. Take the victim to a hospital for treatment or await the arrival of the medical help.
8. Monitor the victim and document the incident.

DISCLAIMER: The information in this poster is not a substitute for proper first aid training.

Get Certified First Aid Training and Quality First Aid Kits at www.alscofirstaid.com.au

The Rising Cost *of Falling Objects*

No harnesses. No hard hats. And seemingly no worry that every step they took could well be their last. Hundreds of feet above Great Depression-era New York City, construction workers were, to a *New York Times* writer, "strolling on the thin edge of nothingness."

Still Work to Do

Thankfully, at-heights safety has come a long way since the "sky boys" of the late 1920s and early 1930s were transforming the NYC skyline; but there's still plenty of work to do – especially when it comes to preventing the often-catastrophic effects of dropped objects.

According to the Bureau of Labor Statistics, dropped objects accounted for 247 fatalities along with hundreds of millions of dollars' worth of damage and medical expenses in 2015. But while much time and effort has been put into perfecting PPE meant to lessen the damage of objects after they're dropped, relatively little attention has been given to solutions (such as tool lanyards) aimed at preventing those dropped objects in the first place. Even the most technologically advanced PPE is no match for a simple hand tool dropped from a few stories up and packing thousands of pounds of punch.

Today, there is next to nothing in the way of industry guidance or regulatory oversight. Fortunately, that should be changing soon.

Dropped Objects Standard in the Works

The brainchild of a select group of leading safety equipment manufacturers and the International Safety Equipment Association (ISEA), the American National Standard for Dropped Object Prevention Solutions (a working name) will focus on preventative solutions actively used by workers to mitigate these hazards and establish classification of these solutions. Scheduled for release in late 2017/early 2018, the standard is not anything that will be enforced with fines or penalties, but instead will act as an important guide for employers on how to reduce the risk of dropped objects while possibly informing future enforceable regulation.

[READ OUR TECH BULLETIN ON THE FORTHCOMING DROPPED OBJECTS STANDARD]

The initial standard will likely include three classes of solutions:

- ***Tool Attachments*** – Retrofit attachment points installed onto tools and equipment to allow for tethering.
- ***Tool Lanyards*** – Tethers that connect tools to an anchor point.
- ***Containers*** – Bags, buckets and pouches used to transport tools and equipment to and from at-heights workzones.

The Rising Cost *of Falling Objects continued*

Demystifying a Foreign Concept

While the use of a body harness for people working at heights is standard practice, tethering the tools they're using is not. Typically, the potential dangers of falling objects at job sites are addressed with passive engineering controls like toe boards, netting, barricades and the like. But active controls like those called out in the forthcoming dropped objects standard are much less common.

Some safety equipment manufacturers have started offering solutions aimed at taking the mystery out of the process. Ergodyne's Squids® Tool Tethering Kits, for example, provide workers with a complete tethering system in one grab-and-go package, so they can be confident they have everything they need to tether their tools safely and effectively.

As the global leader in innovative at-heights safety solutions, Ergodyne has a host of new safety solutions including durable hoist buckets, shock-absorbing tool lanyards and more – each designed to prevent or minimize the risk of dropped objects.

But for Tool Tethering and Objects at Heights Safety to really catch on across industries in any meaningful way, approachable, "out-of-the-bag" solutions like the Squids® Tool Tethering Kit need to be complemented by education and awareness efforts. So we're also at the forefront of education efforts, producing resources like white papers, training videos and our Ultimate Tool Tethering Guide.

Nate Bohmbach is an associate product director at Ergodyne, a certified DROPS (Dropped Object Prevention Scheme) trainer, and sits on the National Association of Tower Erectors' (NATE) PPE Subcommittee.

WANTED:
KNOWN KILLERS

RESPONSIBLE FOR HUNDREDS OF DEATHS ANNUALLY

A tape measure is nothing to be scared of, right? Wrong. When dropped from heights, this thing may as well be a falling machete. In some countries, dropped objects account for over 5% of workplace fatalities – deaths that could have been avoided if the proper training and prevention programs had been in place.*

As a global pioneer, innovator and leader of all things objects at heights, Ergodyne stands ready to serve your training and equipment needs. To start a prevention program, answer questions or find out where to buy, email orders@ergodyne.com.

**According to the Bureau of Labor Statistics, 247 worker fatalities occurred due to a falling object from heights in the U.S. in 2015.*

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Minimizing construction risks from **employee turnover**

Constant change makes it difficult to maintain safety standards

By STEVE WRIGHT

It cannot be stressed enough that safety should be paramount on the construction jobsite.

Unfortunately, some things work against safety; employee turnover is one of them.

The turnover in construction was about 20 prcent in 2014, which is actually under the national average across all professions but is high for the industry. For workers 25 years old and under, that turnover rate reached 38 percent. As with every other industry, an improving economy makes it easier to switch to a better paying job.

Causes and costs of high turnover in construction

By its nature, construction tends to be a transient business where the employees are hired on a project-by-project basis, more like temporary or contract workers than full-time employees. They cannot be assured the workplace will be the same from one day to the next, and their workmates change often. Constant change makes it difficult to maintain safety standards.

Add to this the fact that construction workers are more likely to be injured in the first 30 days on the job. For most people, the first month on a new job is hectic enough. Add heavy equipment and materials and the possibility of getting hurt before complete orientation becomes much higher.

The upshot of this is that the cost of turnover, both direct and indirect, comes to about 20 percent of an unskilled employee's annual pay and benefits package. That isn't the worst of it. These same costs rise to 150 percent when talking about skilled workers.

Minimizing construction risks from **employee turnover** *continued*

High turnover exacerbates common safety issues

You are already aware of the most common safety issues on a construction site: falls due to lack of safety equipment and training. The desire to control costs and make a profit can lead to unwise cost-cutting. The result can be unnecessary accidents and injuries, a higher number of insurance claims, and other costs.

To add to the misery, the hiring standards may be lowered to find workers, putting younger and much less skilled workers at risk. Younger supervisors may be unfamiliar with safety requirements and remain unaware of the industry's new emphasis on risk management.

Solutions to high turnover and safety issues

The first step is to cultivate effective leadership at all levels of your business that can build a culture of safety across all functions of the company. Develop leadership skills that far exceed minimum standards. Your leadership must foster a positive work environment and drive discretionary effort to increase safety training and awareness.

Your employees need to be able to count on that leadership to hear and handle their concerns fairly and promptly. They should be guided through adequate training and remain engaged in ongoing safety efforts. Let your employees see what the impact of safety has on budgeting, scheduling, quality, and the work environment. Make them partners in workplace safety.

Stay ahead of the curve with continuous safety improvement:

- Plan appropriately to address existing and potential safety issues.
- Let all employees know about safety standards and planned controls.
- Emphasize to management and supervisory staff the importance of observation and enforcement of compliance.
- Empower the workers themselves to intervene when needed to help protect fellow workers.

To maximize awareness, review the safety programs and processes on a regular basis to make improvements.

> "MAKE SURE EVERYONE UNDERSTANDS THE SAFETY PROCEDURES BEFORE THEY BEGIN WORKING ON THE PROJECT"

Training is crucial, especially for those in management and supervisory roles. These are the leaders on the frontline of risk management. They link the directives of upper management and the employees those directives impact. Contractors should conduct management orientation and training in all responsibilities regarding policies and procedures facilitating occupational safety and health.

Minimizing construction risks from **employee turnover** *continued*

Demonstrate your commitment to safety

Write down the rules and procedures, and then post them where everyone can see them. Train those supervisors onsite so they are familiar with this specific project's needs. When you are hiring and evaluating supervisors include the ability to follow protocol as one of the key skills required for the position.

The same goes for other employees. Make sure everyone understands the safety procedures before they begin working on the project. The direct impact will be a cost reduction that correlates with the reduction of accidents and morale will improve significantly.

Safety on a construction site is paramount, but high employee turnover represents a step backward from that goal every time a worker is replaced. Those first 30 days are the most dangerous. By working to retain employees their chances of injury and fatality and the number of insurance claims you file will be vastly reduced.

Direct Costs
- Termination
- Replacement
- Transition costs

Indirect Costs
- Loss of production
- Reduced performance levels
- Unnecessary overtime
- Low morale

"LET YOUR EMPLOYEES SEE WHAT THE IMPACT OF SAFETY HAS ON BUDGETING, SCHEDULING, QUALITY, AND THE WORK ENVIRONMENT. MAKE THEM PARTNERS IN WORKPLACE SAFETY."

Steve Wright works for Whirlwind Steel Buildings, a manufacturer of pre-engineered steel buildings and components. To learn more, visit http://www.whirlwindsteel.com.

Voluntary Standards *Cover the Spectrum:*

From Good Manufacturing Practices to Ventilation Control

In an effort to communicate the vital role that standards play in daily life, the American National Standards Institute (ANSI) publishes snapshots of the diverse standards initiatives undertaken in the global and national standards arena, many of which are performed by ANSI members and ANSI-accredited standards developers. Two of the latest selections follow:

Good Manufacturing Practices for Pharmaceutical Excipients

Pharmaceutical excipients are used in pharmaceutical preparations to impact the appearance, stability, and delivery of drug products. The manufacturing process of such excipients is essential to the safety and quality of these products and must meet specifications stated by the manufacturer. Furthermore, it must meet the requirements and expectations of customers and regulatory authorities.

NSF/IPEC/ANSI 363-2016, *Good Manufacturing Practices for Pharmaceutical Excipients*, provides a comprehensive basis for the quality management system used in the manufacture of pharmaceutical excipients. The recently revised standard is intended to define good manufacturing practices (GMP) for excipient manufacture and distribution for use in drug products. It sets minimum requirements for GMP applicable to all commercially available excipients. In addition, adherence to excipient GMP provides assurance that excipients are suitable for use in drug products.

Published by NSF International, the standard also provides guidance to allow for the determination that a pharmaceutical excipient is within the specifications stated by the manufacturer, either qualitatively or quantitatively, and that it does not contain specific undeclared contaminants. The standard was developed with participation from the pharmaceutical excipients manufacturers, public health regulators, and distributors of pharmaceutical excipients..

Ventilation Control and Fire Protection of Commercial Cooking Operations

Operative fire safety requirements can reduce the potential fire hazard of both public and private commercial cooking operations—which can range from restaurants to cafeterias to nursing homes.

The National Fire Protection Association's (NFPA's) revised NFPA 96-2017, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, provides the minimum fire safety requirements (preventative and operative) related to the design, installation, operation, inspection, and maintenance of all public and private cooking operations. Requirements include, but are not limited to, all manner of cooking equipment, exhaust hoods, grease removal devices,

Voluntary Standards *Cover the Spectrum: continued*

exhaust ductwork, exhaust fans, dampers, fire-extinguishing equipment, and all other auxiliary or ancillary components or systems that are involved in the capture, containment, and control of grease-laden cooking effluent.

ANSI offers subscriptions by selecting listing of over 100 standards developing organizations or selecting from a listing of pre-defined industry collections currently available for subscription. A standards subscription provides convenient and cost-effective, multi-user access to specific standards, and subscribers can create a customized site license collection by selecting standards from a wide range of different standards developers.

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The Institute is the official U.S. representative to the International Organization for Standardization (ISO) and, via the U.S. National Committee, the International Electrotechnical Commission (IEC), and is a U.S. representative to the International Accreditation Forum (IAF).. For more information, visit www.ansi.org.

A fatal false sense of security

Why workplace accidents often happen late in projects

This article is based on the non-fiction book, "Trapped Under the Sea," written by Neil Swidey and published in 2014 by Crown Publishing Group. Assisting with this article was Tania Clarke.

Some jobs obviously carry a higher risk than others. Often when we start a job we are aware and cautious. As time goes on, many of us become comfortable, with a false sense of security.

This behavior is described as "normalization" -- also known as habituation. Habituation is defined as the diminishing of a physiological or emotional response to a frequently repeated stimulus.

It is why workplace accidents tend to happen later in a project, as noted by Neil Swidey, author of "Trapped Under the Sea."

Neil has spent years researching workplace health and safety data. Writing in the *Harvard Business Review*, he reports that whether it's a small home-improvement project or a large public infrastructure mega project, trouble typically arises late in the project timeline:

"The more people do something without suffering a bad outcome, the harder it becomes for them to remain aware of the risks associated with that behavior. The most obvious example of this in everyday life is texting while driving. Most of us have been guilty of this risky behavior, even if we don't want to admit it. And if we've never suffered an accident as a result of all of furtive thumbing from behind the wheel, we might have even fooled ourselves into thinking we're just better at it than most people. We're not. That's simply the seductive yet slippery power of normalization at work."

Tips to avoid normalization

- Identify hazards, circumstances and conditions to look out for at the start of the project. Have a weekly checklist meeting to mitigate risks by keep tracking of all identified risks.

A fatal false sense of security *continued*

- Consider a behavior observation program.
- Be realistic about project milestones and completion dates set in place.
- Make everyone a safety hero and give them the checklists and tools to self-assess at all stages.
- Set up a reward program for employees who identify potential risks.

High confidence, low tolerance

Injuries and deaths often occur late in the job, when confidence runs high (if there have been no major accidents) and tolerance for delays dips low. This is when normalization kicks in, which often allows people to accept looser standards in the name of greater speed (meet or beat the deadline). The more people do something without suffering a bad outcome, the harder it becomes for them to remain awareness of the risks associated with at-risk behavior.

Lesson from under the sea

Before Neil spent five years researching his book "Trapped Under the Sea," the true story of a team of commercial divers sent to finish the multibillion-dollar cleanup of Boston Harbor, he intuitively assumed that the most dangerous time on a job was Day One. After all, that's when workers are usually getting oriented to a new setting, new colleagues, and new equipment, and when the learning curve is steepest. But after marinating in workplace safety data, Neil came to understand that the opposite is true.

In the 1980s, Boston had the dirtiest harbor in America. Today, Boston has what is widely considered the cleanest urban harbor in America, one of the most dramatic environmental transformations in recent American history. Yet it came at a deadly cost. The massive cleanup effort, which took more than a decade and cost $4 billion, claimed the lives of five workers. Tellingly, none of those fatalities happened early in the job.

Two deaths involved a small team of divers dispatched to the far end of the world's longest tunnel of its kind, a ten-mile long dead-end tube carved into the bedrock hundreds of feet of below the ocean floor. This Deer Island Outfall Tunnel was the largely overlooked centerpiece of the harbor cleanup. Up to one-billion gallons of wastewater now flows through the tunnel and out to sea every day, with gravity serving as the only power source.

For the decade it took to build this engineering marvel, electrical power, rail transportation, and ample ventilation all flowed through the full length of the tunnel. These were the utilities that kept tunnel workers alive.

Clouded thinking

At the conclusion of the tunnel construction, the various best-and-brightest minds overseeing the project were engaged in bitter battles over cost overruns. A dangerous game of corporate chicken played out. Managers decided to remove the electrical power, rail transportation, and ventilation

A fatal false sense of security *continued*

system. At the far end of the tunnel, 55 large safety plugs still needed to be removed. To do this, managers sent a team of commercial divers to travel – first by vehicle, then by foot – to the end of the pitch-black, oxygen-starved tunnel. At the tunnel's end, the divers had to shimmying into the series of slimy 55 connector pipes -- so narrow that they were scarcely wider than each diver's shoulders. In each connector pipe, they would need to remove a heavy safety plug that had helped keep workers safe during the decade it took to build the tunnel, by keeping the Atlantic Ocean out of it.

> "IN EVERYTHING FROM SMALL HOME-IMPROVEMENT TASKS TO PUBLIC INFRASTRUCTURE MEGAPROJECTS, INJURIES AND DEATHS TEND TO HAPPEN LATE IN THE JOB, WHEN CONFIDENCE RUNS HIGH AND TOLERANCE FOR DELAYS DIPS LOW. THIS IS WHEN NORMALIZATION KICKS IN."

Five divers were sent in. Only three made it out alive. And even those three survivors came within 30 seconds of losing their lives.

The tunnel was 24 feet wide at the start, but just five feet in diameter at the end. Then the divers had to crawl into a series of 30-inch-wide pipes to remove the plugs. Because the distance was too far to rely on the conventional supply of bottled air, the diving company's project manager came up with an experimental system: the divers would need to mix their breathing air in the tunnel, using the vapors from tanks of liquid oxygen and liquid nitrogen. They relied on souped-up Hummer Humvees to get them part way into the tunnel. But when it became too narrow, they had to trudge along on foot, lugging their equipment with them, in the dark.

The deaths of two of the divers resulted from the experimental -- and defective -- breathing apparatus. How could the project's managers, who had demonstrated remarkable skill and prudence for a decade on this job, have made such a colossally bad decision involving the breathing system at the very end of the project, gambling with other people's lives?

They had fallen victim to normalization. In this case, people accepted looser standards in the name of greater speed. As noted, the more people do something without suffering a bad outcome, the harder it becomes for them to remain aware of the risks associated with that behavior.

Broad lessons

This underwater tragedy has lessons for any task "involving some level of hazard, from cleaning gutters to chopping vegetables. If it was worth climbing down from the ladder to move it a few feet at the beginning of the job, it should be worth taking that same sensible precaution near the end," Swidey writes.

"Whenever a worker dies, there is a natural inclination to hunt for a huge, single failure that can be blamed. In reality, a worker's death is usually caused by a series of small, bad decisions made by many individuals, none of which, on its

A fatal false sense of security *continued*

own, would have been enough to produce a fatality. Disaster strikes only when all the holes in the Swiss cheese line up," he writes.

Those holes tend to line up at the end of a project, due to time pressures, frustrations, impatience, stubbornness, becoming habituated and immune to risks -- and even more so if there are cost-overruns and long delays in reaching the project's completion.

One example of the time pressure involved: The divers sent into the tunnel had about two weeks to train and get to know one another. For high-risk space missions NASA typically gives its teams at least a year to train, Swidey said in an interview on www.signature-reads.com.

"The particulars of the accident at the center of the book are so unusual that they will likely never be repeated again," said Swidey. "But the forces that set in motion the problems are universal to ambitious undertakings of every kind. I think that's what makes the lessons embedded in this book so valuable.

"This project attracted some of the best and brightest minds in the country. And no one consciously set out to put these divers' lives on the line. Yet that's exactly what they had done. The massive infrastructure projects that make modern life possible -- our bridges, tunnels and skyscrapers -- all require some amount of risk for the workers charged with converting design into reality. We owe it to the workers we put into harm's way to make sure we've done whatever is possible to minimize that risk."

> "THE MORE PEOPLE DO SOMETHING WITHOUT SUFFERING A BAD OUTCOME, THE HARDER IT BECOMES FOR THEM TO REMAIN AWARE OF THE RISKS ASSOCIATED WITH THAT BEHAVIOR. THIS IS THE SEDUCTIVE YET SLIPPERY POWER OF NORMALIZATION AT WORK."

Neil Swidey is the author of "Trapped Under the Sea: One Engineering Marvel, Five Men, and a Disaster Ten Miles Into the Darkness," which was named one of the best books of 2014 by Amazon and Booklist. It is now out in paperback. A staff writer for *The Boston Globe* Magazine, Swidey is also the author of "The Assist "and co-author of the Ted Kennedy biography, "Last Lion."

Parts of this article were posted as a blog by Tania Clarke on https://safetyculture.com. SafetyCulture is a technology company that develops innovative, low-cost, mobile-first applications that empower users to have safe and efficient workplaces.

Avoid costly collisions

Driving a forklift? Pedestrians generally have the right-of-way

By UL EHS Sustainability Editorial Team

Powered industrial trucks—forklifts—are commonplace in manufacturing and warehousing facilities. They are crucial to ensure the safe material transport of goods. They can also be deadly.

Reported statistics place the number of forklift-related accidents at close to 100,000 per year (100 fatal accidents, 34,900 serious injury accidents, and 61,800 non-serious accidents). More than 40 percent of fatalities are due to the forklift rolling or toppling on top of the operator or other worker.

Individuals who handle heavy material handling equipment such as forklifts need to take special precautions to ensure that the materials they transport are properly handled. The safest place for a driver to be is strapped into a seat with a seat belt.

Hazards associated with operation include mounting and dismounting (risk of head injury, slips, trips, and falls); starting and stopping; operating at speeds (risk of tip overs and collisions with pedestrians or objects); steering, turning, and changing direction (risk of tip overs and collisions with pedestrians or objects); reversing (risk of risk of tip overs and collisions with pedestrians or objects); travelling on inclines (risk of tip overs and falling loads); parking (risks of collisions or unintended movement).

Load handling presents an additional set of hazards to operators. Off-center loads, overloading, and damaged or loose loads can all cause tip over or falling loads and collisions if the

Avoid costly collisions *continued*

driver's view is impaired. Moving loads onto truck trailers or railroad cars can cause falling and tip over hazards, as well as potential hazards to other workers.

Forklifts can be especially dangerous for pedestrians. OSHA's website contains several sections dedicated to the dangers associated with forklifts. If you work with or around powered industrial truck, make sure you're informed and aware of the dangers.

Forklift collisions

OSHA estimates there are 1.5 million lift operators in the United States. That's a lot of lifts, and a lot of people around lifts. Forklifts and workers must remain apart. There are differing perspectives on who should have right of way (who yields to whom).

Until recently, there wasn't any language that clearly specified which party should have right-of-way. The 1969 forklift consensus standard that OSHA references just says to stay out of the way of ambulances, fire trucks, and other vehicles in emergency situations. The 2015 version of the ANSI standard, Section 5.3.2 provides the updated guidance to lift operators, "Yield the right of way to pedestrians and emergency vehicles such as ambulances and fire trucks."

Forklifts are the second leading cause of machine-related death in the workplace. Struck-by and tip-over are the two leading causes of forklift-related fatalities. Each year in the United States, on average, 100 die, 95,000 are injured, and 20,000 are seriously injured. An average of 60 lost workdays is incurred per incident (9x the average for all other injuries). Bad things happen when people and lifts attempt to share the same place in time.

Currently more than half of all U.S. states are covered by OSHA Local Emphasis Programs that target industrial trucks and warehouse safety. Compliance officers will look more thoroughly at lift operations and may be more likely to visit industries known to operate lifts.

Losers in collisions; winners in court

Consensus standards, such as ANSI standards, are more than suggestions. Consensus standards define the generally agreed upon standard of care, which matters in a court of law. And they define hazards and precautions that should have been recognized, which matters when OSHA "General Duty" catch-all clause citations are issued.

The message is and always has been the same: separate forklifts and pedestrians. People are vulnerable relative to industrial vehicles and people generally have the right of way in plant settings (just as they would on public streets). Things usually play out this way in jury trials where negligence lands on forklift operators more times than not.

In August of 2015, $15.2 million in relief was awarded to a worker whose foot was seriously injured when he was struck and run over by a forklift at a trade show in Chicago. The forklift operator worked for the show's organizer who was

Avoid costly collisions *continued*

breaking down booths; the injured party was representing an exhibitor at the show. OSHA citations totaling $91,000 were issued for failing to ensure driver training, failing to ensure safe clearances for forklift operations, failing to train drivers on specific issues related to pedestrians present, and other related issues. The prosecution called attention to the weight of the lift (58,000 pounds) and entered testimony from witnesses alleging that the driver did not keep a clear view of his path and did not maintain a proper lookout or spotter.

In this case and others, most of the responsibility falls on lift operators. Cases like this imply pedestrians have right of way. Cases like this also show that being right doesn't always equate to staying safe.

Preventing collisions

There has been a lot of regulatory focus on forklift operators, yet frequency and severity remain relatively high in comparison to other industry exposures. Perhaps regulators have focused on the wrong thing? Maybe forklift operators are not solely to blame when workers are struck by forklifts?

There is no standard that speaks to the responsibility of pedestrians. Leading companies preach mutual responsibility or "safety is everyone's responsibility" and educate about the severity of forklift incidents, lift and operator limitations, and how to establish intentions through eye contact and hand signals.

Beyond education of lift operators and pedestrians, the workplace and lifting equipment must be maintained in good operating condition. This includes ensuring adequate lighting, good floor conditions and housekeeping, marking and protecting walk aisles, and allocating aisle widths conducive to lift operation. Last but not least, employer management systems must ensure proper diagnosis and closure of incidents and issues voiced.

> "IN AUGUST OF 2015, $15.2 MILLION IN RELIEF WAS AWARDED TO A WORKER WHOSE FOOT WAS SERIOUSLY INJURED WHEN HE WAS STRUCK AND RUN OVER BY A FORKLIFT AT A TRADE SHOW IN CHICAGO."

When pedestrians and lifts collide, everybody loses. It's important that everyone knows what their responsibility is.

> "THE MESSAGE IS AND ALWAYS HAS BEEN THE SAME: SEPARATE FORK-LIFTS AND PEDESTRIANS."

Written by UL EHS Sustainability Editorial Team and posted on www.ulehssustainability.com. Forklift collisions written by Jonathan Jacobi and posted on www.ulehssustainability.com . UL's senior leaders and diverse team of safety, health, environmental and risk management subject matter experts regularly write insightful articles and white papers that help define and promote best practices and explore emerging trends in workplace health and safety. UL EHS Sustainability, 5000 Meridian Blvd., Suite 600, Franklin, TN 3706.

OSHA's standard *on Welding, Cutting and Brazing*

OSHA's standard on Welding, Cutting and Brazing: 1910.252

History:

OSHA's standards for welding, cutting and brazing in general industry and construction were based on the 1967 ANSI standard Z49.1.

Why this standard is important:

Welding, cutting and brazing are hazardous activities that pose a unique combination of both safety and health risks to more than 500,000 workers in a wide variety of industries. The risk from fatal injuries alone is more than four deaths per thousand workers over a working lifetime.

Hazards:

Health hazards from welding, cutting, and brazing operations include exposures to metal fumes and to UV radiation. Safety hazards from these operations include burns, eye damage, electrical shock, cuts, and crushed toes and fingers. Many of these can be controlled with proper work practices and PPE.

Enforcement Statistics:

October 2015 through September 2016 – totals for all industries
Citations: 145
Inspections: 119
Penalty: $369,553

Most Frequently Cited Provisions:

- If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.
- Wherever there are floor openings or cracks in the flooring

OSHA's standard *on Welding, Cutting and Brazing*
continued

that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

- When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source.

Most cited industries:

1. Fabricated Metal Product Manufacturing
2. Machinery Manufacturing
3. Transportation Equipment Manufacturing
4. Electrical Equipment, Appliance, and Component Manufacturing
5. Merchant Wholesalers, Durable Goods
6. Specialty Trade Contractors
7. Primary Metal Manufacturing
8. Support Activities for Mining
9. Motor Vehicle and Parts Dealers
10. Miscellaneous Manufacturing

What must employers do to protect employees?

Welders should understand the hazards of thematerials they are working with. OSHA's Hazard Communication standard requires employers to provide information and training for workers on hazardous materials in the workplace. Welding surfaces should be cleaned of any coating that could potentially create toxic exposure, such as solvent residue and paint. Workers should be positioned to avoid breathing welding fume and gases. For protection from radiant energy, workers must use PPE, such as safety glasses, goggles, welding helmets or welding face shields.

Key Letter of Interpretation:

OSHA's welding, cutting, and brazing standard, 29 C.F.R. §1910.252(b)(3), outlines specific PPE requirements for welders. This provision states that employees exposed to the hazards created by welding, cutting, or brazing operations must be protected by PPE in accordance with the requirements of the general personal protective equipment standard, §1910.132. The welding standard also states that "[a]ppropriate protective clothing required for any welding will vary with the size, nature and location of the work to be performed." Therefore, if welders are exposed to flash fires or short-duration flame exposures, OSHA expects that employers would provide and ensure the use of FRC to protect workers from these hazards.

OSHA's standard *on Welding, Cutting and Brazing*
continued

Significant Enforcement Cases:

OMAHA, Neb. – A worker at Watco Investments LLC reported suffering from respiratory inflammation after performing welding work inside a rail car in Omaha. OSHA cited the company in September 2014, operating as Watco Companies Inc., for three repeat and three serious safety violations, many involving OSHA's confined space safety regulations. OSHA has proposed fines of $133,900 for the company, which specializes in rail car repairs.

NEWARK, Ill. – For the second time in two years, federal safety inspectors found workers risking amputations and other serious injuries as they fed parts by hand into an unguarded mechanical press brake at an Illinois trailer manufacturing plant. They also found the company failed to protect welders and other employees from harmful ray emissions during welding operations. On Aug. 5, 2016, the U.S. Department of Labor's Occupational Safety and Health Administration issued one willful, one repeated and five serious violations to the Newark-based Dierzen Sales LTD. The company faces $153,791 in proposed fines.

Compliance Assistance:

Eye Protection against Radiant Energy during Welding and Cutting in Shipyard Employment. OSHA Fact Sheet, (2012, January). Discusses protection from radiant energy and the requirements for workers to use personal protective equipment.

Controlling Hazardous Fume and Gases during Welding. OSHA Fact Sheet FS-3647, (2013).

Arc Welding Safety (PDF). National Ag Safety Database (NASD), (1989, May). Provides suggestions and guidelines to minimize a number of hazards involving the electric arc welder.

OSHA's standard *on Ladders*

OSHA's standard on Ladders: 1926.1053

Why this standard is important:

Falls from portable ladders (step, straight, combination and extension) are one of the leading causes of occupational fatalities and injuries.

Hazards:

Working on and around stairways and ladders is hazardous. Stairways and ladders are major sources of injuries and fatalities among construction workers for example, and many of the injuries are serious enough to require time off the job. OSHA rules apply to all stairways and ladders used in construction, alteration, repair, painting, decorating and demolition of worksites covered by OSHA's construction safety and health standards.

Enforcement Statistics:

October 2015 through September 2016 – totals for all industries
Citations: 2,392
Inspections: 1,967
Penalty: $4,470,537
#7 on OSHA's Top 10 Most Frequently Cited Standards

Most Frequently Cited Provisions:

- Each self-supporting portable ladder: At least four times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladder shall sustain at least 3.3 time the maximum intended load. The ability of a ladder to sustain the loads indicated in this paragraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction. Ladders built and tested in conformance with the applicable provisions of appendix A of this subpart will be deemed to meet this requirement.

OSHA's standard *on Ladders continued*

- The minimum clear distance between the sides of individual-rung/step ladders and the minimum clear distance between the side rails of other fixed ladders shall be 16 inches (41 cm).
- Fixed ladders without cages or wells shall have a clear width to the nearest permanent object of at least 15 inches (30 cm) on each side of the centerline of the ladder.

Most cited industries:

1. Specialty Trade Contractors
2. Construction of Buildings
3. Merchant Wholesalers, Durable Goods
4. Heavy and Civil Engineering Construction
5. Administrative and Support Services
6. Miscellaneous Manufacturing
7. Real Estate
8. Repair and Maintenance
9. Utilities
10. Professional, Scientific, and Technical Services

What must employers do to protect employees?

These rules specify when employers must provide ladders. In general, the standards require the following:

- When there is a break in elevation of 19 inches or more and no ramp, runway, embankment or personnel hoist is available, employers must provide a stairway or ladder at all worker points of access.
- When there is only one point of access between levels, employers must keep it clear of obstacles to permit free passage by workers. If free passage becomes restricted, employers must provide a second point of access and ensure that workers use it.
- When there are more than two points of access between levels, employers must ensure that at least one point of access remains clear.

Ladders Standard Compliance Directive:

Directive number: STD 01-01-012
Effective date: 6/20/1983
Subject: Application of 29 CFR 1910.27, Fixed Ladders, to Fixed Ladders Used in Emergency Situations

Ladders Key Letter of Interpretation:

While OSHA does not have a specific standard covering personal ladder boom support systems, the use of the equipment in the manner described would not be compliant with multiple OSHA standards. Such standards would include, but are not limited to, the OSHA construction ladder standard (29 CFR Part 1926, Subpart X), the fall protection standard (29 CFR Part 1926, Subpart M), and the scaffold standard (29 CFR1926, Subpart L).

Ladders Significant Enforcement Cases:

HAMILTON, N.J. – The U.S. Department of Labor's Occupational Safety and Health Administration cited roofing

OSHA's standard *on Ladders continued*

company Six Star Builders LLC for 12 serious safety violations found at a Hamilton work site. OSHA issued $33,600 in proposed penalties following an April 2013 inspection begun in response to a referral from the police department regarding a worker who had fallen from the roof to the third floor during a roof collapse. Violations include failing to inspect the structural integrity of the roof; provide fall protection and training; provide ladders that extend at least 3 feet to access the roof; and provide adequate ladders and ladder training.

ST. LOUIS – The U.S. Department of Labor's Occupational Safety and Health Administration cited roofing contractor KG Framing and Construction LLC with 12 safety violations, including one willful and three repeat, for failing to provide roofers with protection from falls at a commercial shopping site in Maryland Heights in April 2013. Proposed fines total $121,480. The company has been cited six times for this violation. Repeat violations include failing to extend ladders at least 3 feet above the landing surface.

Ladders Compliance Assistance:

Stairways and Ladders, a Guide to OSHA Rules, Publication 3124. This booklet published in 2003 provides a general overview of the standard and requirements.

OSHA Quick Card: Portable Ladder Safety. This informative tip sheet offers instructions on preventing falls from portable ladders.

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