Industrial Safety & Hygiene News

September 2016

ISHN

INSIDE this eBOOK:

Safety & health best practices

- Hand injury costs can be staggering
- New glove testing standards
- One size doesn't fit all
- Good grip reduces exertion and fatigue

Your guide to

hand protection safety

introduction

Welcome to *ISHN*'s first volume of feature articles and sponsored content relating to on-the-job hand protection. Safety and health professionals in every industry will benefit from the latest updates and innovations in work gloves – perhaps the most ubiquitous personal protective equipment (PPE) used by workers.

The U.S. Bureau of Labor Statistics reports that about 110,000 hours a year are lost to hand injuries, and hand injuries send more than one million workers to the emergency room each year.

Typically, the cost of implementing a hand protection program far exceeds the cost of one injury. Hand injuries resulting from cuts and puncture cost the construction industry alone approximately $382 million each year, second only to back strain and sprain injury, according to the BLS.

The National Safety Council offers a guide to estimating costs: Direct cost of a laceration is about $10,000; stitches about $2,000 plus indirect costs; butterfly about $300; and severed tendon about $70,000.

According to the BLS, 70 percent of workers who experienced hand injuries were not wearing gloves. And the remaining 30 percent of injured workers that did wear gloves experienced injuries because the gloves were inadequate, damaged or the wrong type for the type of hazard present.

OSHA's hand protection (PPE) standard mandates that employers select and require employees to use appropriate hand protection when employees' hands are exposed to the following hazards:

- skin absorption of harmful substances
- severe cuts or lacerations
- severe abrasions or punctures
- chemical burns or thermal burns
- harmful temperature extremes

Articles in this eBook cover the following:

- Global standards for protective gloves
- New glove testing standards — 10 things you need to know
- Gloves with a good grip reduce exertion and fatigue
- The cutting edge of hand protection — Form-fitting gloves and cut-resistant materials
- One size doesn't fit all — break with tradition and match gloves to hazards
- Assessing levels of abrasion, cut, tear & puncture exposure
- Function, feel & protection
- Beyond arc flash protection — Protect hands from all possible exposures

ISHN thanks all the subject-matter experts who contributed articles, and appreciates the contributions of ISHN's Hand Protection eBook Volume One sponsors.

I'm sure you'll find this eBook to be valuable in assessing safety and health hand protection risks, technologies and solutions in your workplace.

Dave Johnson
ISHN Editor

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Hand injury costs **can be staggering**

Prevent losses with proper training, right glove for the job

By BENITA MEHTA, ISHN Managing Editor

The U.S. Bureau of Labor Statistics reports that about 110,000 hours a year are lost to hand injuries and they send more than one million workers to the emergency room each year. In addition to the suffering they cause, the cost of these preventable incidents to employers can be tremendous. Typically, the cost of implementing a hand protection program far exceeds the cost of one injury.

According to the U. S. Centers for Disease Control and Prevention, hand injuries account for 1,080,000 emergency department visits by workers per year in the United States. Hand injuries resulting from cuts and puncture cost the construction industry approximately $382 million each year, second only to back strain and sprain injury, according to the BLS.

The National Safety Council offers a guide to estimating costs: Direct cost of a laceration is about $10,000; stitches about $2,000 plus indirect costs; butterfly about $300; and severed tendon about $70,000.

The right glove

According to the BLS, 70 percent of workers who experienced hand injuries were not wearing gloves. And the remaining 30 percent of injured workers did wear gloves, but experienced injuries because the gloves were inadequate, damaged or the wrong type for the type of hazard present.

To help prevent workplace injuries, OSHA's hand protection (PPE) standard mandates that employers select and require employees to use appropriate hand protection when employees' hands are exposed to the

Hand injury costs can be staggering continued

following hazards:

- skin absorption of harmful substances
- severe cuts or lacerations
- severe abrasions or punctures
- chemical burns or thermal burns
- harmful temperature extremes

OSHA recommends that "gloves be selected based on the task that will be performed, the chemicals encountered, and the performance and construction characteristics of the glove material."

Selecting the right glove for a product can be challenging because a glove designed for one chemical or function may not be effective for another. Employers should begin by conducting a hazard assessment and consider:

- What chemicals are in the product?
- How the worker will come in contact with the chemical (splash or immersion) and for how long?
- How much of the worker's skin will be exposed – hand, forearm, etc.?
- How much dexterity will the worker need?
- Will thermal protection be needed?
- Will the work involve abrasive materials and will the gloves need to be puncture/cut resistant?

Understanding injuries

In order to improve hand protection in the workplace, it helps to understand the common types of hand injuries as well as their causes.

Common types of hand injuries include:

- Fractures, crushed injuries and amputations
- Lacerations, cuts and punctures
- Skin disorders caused by contact with chemicals and burns
- Work-related musculoskeletal disorders (MSD) caused by using a forceful grip, awkward hand and wrist positions, and/or excessive hand vibration

A hand injury, such as the loss of a finger, a broken bone, nerve damage, MSD, or skin disorder, can interfere with a worker's job performance and quality of life, sometimes ending a career. Work-related hand injuries are also costly to the employer, in terms of lost work time and productivity, and higher insurance rates.

Implement proper training

Hand injuries often can be prevented with planning and training. Employers should conduct a job hazard analysis to identify the operations, tools, and tasks that could present a hand-related hazard and take corrective measures to protect workers.

According to www.choosehandsafety.org, employers should ask themselves the following questions:

- What tasks will be performed and which crafts and workers will perform each task?
- Which tools, equipment, chemicals and materials create a potential risk for a hand injury (including skin disorders like dermatitis, chemical burn, etc.)?
- Which tools and equipment will be used? Are they

Hand injury costs can be staggering *continued*

appropriate for the tasks and in proper working order?

- Are chemicals and products properly stored and labeled?
- Is there a way to prevent hands from coming in contact with the hazard, such as a guard or device to create a barrier between the worker's hand and the hazard?
- Are their engineering controls available (e.g., lifting points, tools with cushioned grips, anti-slam devices, anti-vibration handles, etc.)?
- Are there administrative controls in place – rules and signage to remind workers to remove rings, not wear loose clothing near rotating equipment, lockout/tagout procedures, etc.)
- Is personal protective equipment required? If yes: What types of gloves are required for the material/products/chemicals?
- Are the right gloves available in the sizes needed?
- Where will they be stored on the job site? Who will be responsible for making sure the supply is stocked with the right gloves and sizes?
- How will workers be informed about which gloves to use, when to use them, where to go to get the gloves on the job site, and when to replace them?

All employees should be trained before any work begins on the hand-related hazards present on the job and the potential health and skin related safety risks such as cuts, amputation, crush, etc. Training manuals should include specific examples of injuries that could occur or have occurred if precautions were not taken; the company's plan and methods to protect workers from the hazards, including the proper selection of hand tools and use of equipment, appropriate protective clothing, proper hygiene practices, and other requirements.

If gloves are required, the training should include information on the gloves to be used for specific task, including the hazards the gloves will protect against; the importance of wearing gloves that fit; how to inspect the gloves for damage to ensure they offer proper protection; and how frequently to replace gloves.

Tracking progress should also be part of any training program. Improving hand safety requires an ongoing employer commitment and continuous monitoring to ensure the training and preventive measures are understood and are making a difference. There are several ways to track progress: on-site monitoring to learn whether workers are wearing gloves, using guards and aware of preventive measures to avoid hand injuries. Follow-up training can be done to reinforce hand safety, find gaps in awareness and knowledge, and keep workers, supervisors and other employees up to date on the latest ways to prevent hand injuries. Also be sure to keep an eye on injury data to check on whether there are fewer hand injuries since implanting the training program.

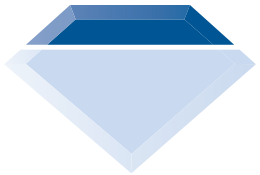
Workplace Hand Protection: **The Dyneema® Perspective**

Safety managers have one of the most difficult jobs in any manufacturing operation. Often there is too much information coming at them to digest it all. This can lead to decisions to focus on selecting safety gloves with the highest level of cut protection, now ANSI level A9, even when it is neither needed nor desirable. This is often not a good thing because gloves that achieve cut scores in the upper end of the range are often stiff and inflexible, so in going with the highest score they are choosing a glove that people simply won't wear.

A recent workplace hand safety study commissioned by DSM Dyneema and executed by the American Society of Safety Engineers showed data points that raise eyebrows. Most significant is how little the injury numbers and safety protocols have changed over time, despite improvements in technology and increased regulations. More information on this research soon will be available at www.dyneema.com and via our electronic newsletter (add subscription link).

While test results are one reference point to factor in the decision to purchase cut resistant gloves, relying on test results alone is a dangerous proposition. Choosing the right hand protection for a facility needs to more be than simply a "checking the box" exercise.

Hand injuries are the #1 preventable injury in the workplace. Yet there are millions of recordable hand injuries every year, even in this era when information abounds and glove choice



Dyneema®

seems nearly limitless. Decision makers don't need to be glove experts. However, they should consult with knowledgeable professionals to make the right choice for the applications unique to their workplaces. This can start with a conversation with glove manufacturers about specific hazards, test methods, and current or common injury concerns. With the right gloves, businesses can save money, increase worker satisfaction, and most importantly improve hand safety.

As many as 8 of 10 companies are not controlling usage the way they should. That can lead to a difficult conversation when they suddenly realize they are overspending on gloves, when more efficient usage of the right products could save much of that investment.

All things being equal, reducing hand injuries comes down to putting the resources in place for intensive assessment, training, monitoring and incentivizing. Each position in the operation needs to be fully assessed from the safety perspective, such as what are potential sources of injury and what is the best product for the specific application.

The current trend of higher glove performance that is lighter, more flexible, and more comfortable is likely to continue.

Workplace Hand Protection: The Dyneema® Perspective *continued*

Companies like DSM Dyneema and our innovative Dyneema® Diamond Technology material are at the forefront of combining material science and industry expertise, partnering with the leading glove manufacturers to develop designs that offer protection with enhanced comfort and cost efficiency. Future developments will include lighter, stronger, and more durable hand protection, with a more appealing look and feel incorporated. Well-designed gloves that people want to wear will have the bottom line impact of helping improve compliance and reduce injuries.

For more information about workplace hand protection, visit. www.dyneema.com/handprotection

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Gloves made with Dyneema® deliver maximum protection with much more dexterity and comfort. Dyneema® Diamond Technology has been developed specifically to make gloves that workers want to wear.

Hand Safety:
We can do better.

Safety experts say 70% of hand injuries would be avoided if workers wore protective gloves, but many workers don't—if it prevents them from doing their job. Research shows workers will wear gloves that are comfortable when they understand the safety benefits.

www.dyneema.com/cut-resistant-gloves

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New glove **testing standards**

10 things you need to know

By ALEX CARRILLO-HAYLEY

If you work in the health and safety industry, chances are that you've been hearing all of the buzz about the recent updates to the ANSI/ISEA and EN 388 glove testing processes and classifications. If you're curious about what these changes will entail, you've come to the right place; we've compiled a list of the ten major things that you need to know about the new testing standards, and how they will affect you and your customers.

What you need to know

1. The first crucial thing you need to know is that these changes are designed to improve the accuracy of the testing by making it easier for glove manufacturers to replicate their testing results. For this reason, although you might be feeling a bit overwhelmed by the thought of having to alter your glove testing process, in the long run, these changes will result in an increase in employee safety in the workplace. The standards committee believes that these changes will make it easier for end users to choose appropriate work gloves for their industries, and consequently, help to lower the number of hand-related injuries in the workplace.

2. If you're located in North America, the new ANSI/ISEA 105-2016 standard will be your main concern; the updates were officially approved in February 2016, and are therefore now in effect.

3. One of the main changes to the old ANSI/ISEA standard is the increase in the number of cut levels from five to nine. The ANSI/ISEA committee realized that since the old cut level 4 category covered such a large range (from 1500 to 3499 grams), dividing this large spectrum into smaller sections would result in more differentiation between products. The thought was that this change would benefit end users the most, since it would improve the overall accuracy of glove selection, and therefore, bring about a higher level of safety on the jobsite. For this reason, this change will also prevent end users from assuming that all gloves within the old cut level 4 category provide the same amount of cut protection.

New glove **testing standards** *continued*

4. In order to keep confusion to a minimum during this transitional stage, the new cut levels will now have an A in front of them, instead of just a number. (For example, a glove that offers 200 to 499 grams of cut protection will be rated ANSI level A1 for cut resistance).

5. Here are the cut test requirements for the new ANSI levels:

A1: 200-499 grams to cut
A2: 500-999 grams to cut
A3: 1000-1499 grams to cut
A4: 1500-2199 grams to cut
A5: 2200-2999 grams to cut
A6: 3000-3999 grams to cut
A7: 4000-4999 grams to cut
A8: 5000-5999 grams to cut
A9: 6000+ grams to cut

Wondering how the new cut levels compare to the old ones? See figure 1 for a comparison chart for reference.

6. Another significant change to the old ANSI/ISEA standard will be the addition of a new needle stick puncture test; by improving the way in which the levels of puncture resistance are classified, this will allow for a higher level of protection against puncture threats in the workplace. Also, since the ISO 13997 (TDM) machines generally produce much more consistent results than CPPT machines, the TDM machine is now the recommended testing machine for all future EN 388 and ANSI/ISEA testing.

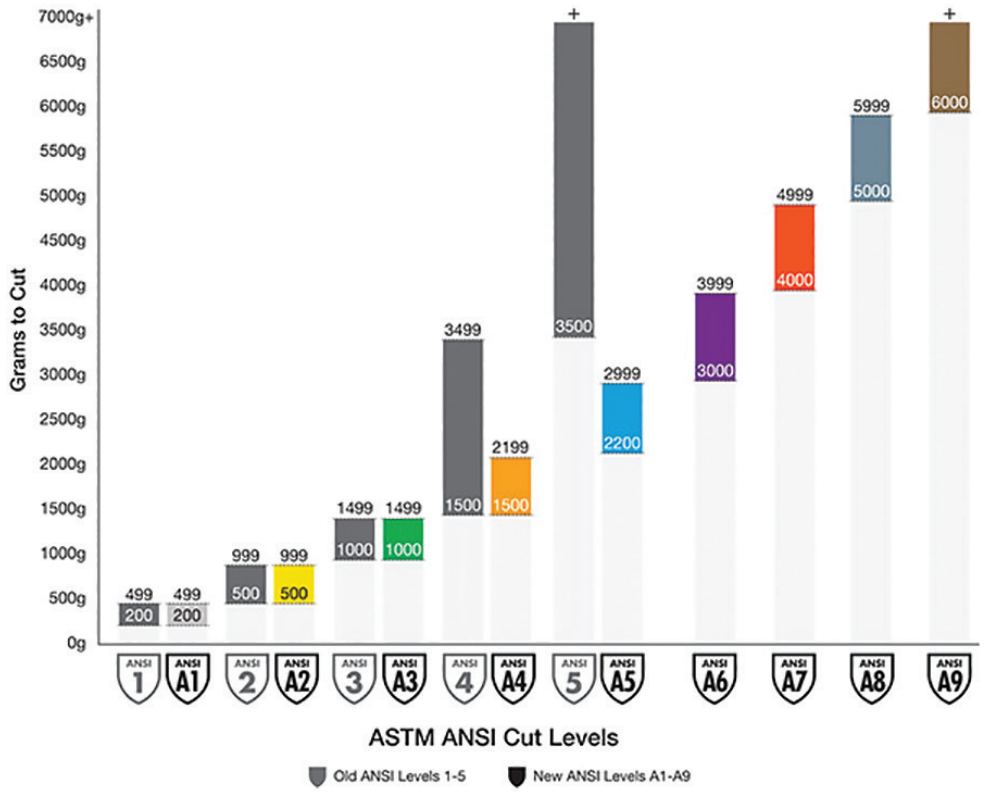

Figure 1 Photo courtesy of Superior Glove

By encouraging everyone to use the same testing machine, the hope is that it will help standardize the way in which cut levels are assigned, meaning that test results from different glove manufacturing companies will be easier to interpret and compare.

7. The new EN 388 standard is the one that will directly affect European customers. While the changes to this standard are still currently pending review, they are expected to be approved during the summer of 2016. Note:

New glove **testing standards** *continued*

Unless this standard becomes adopted by other countries in the future, these changes should only affect those living in the EU.

8. The EN 388 standard needs to be revised due to inconsistences with test results – especially with the cut and abrasion tests. For this reason, the main changes to the EN 388 standard will include the adoption of the ISO 13997 (TDM) cut test as the preferred testing method, the use of a different kind of abrasive paper to increase the accuracy of testing results, and the calculation of test results in Newtons instead of grams. The new EN 388 standard will also include testing for impact protection. For a greater level of consistency across the board, the last six EN 388 levels will also match the new ANSI/ISEA 105 levels, but the EN 388 levels will be designated using the letters A to F.

9. Here are the requirements for the new EN 388 levels:

A: 2 Newtons = 203 grams to cut
B: 5 Newtons = 509 grams to cut
C: 10 Newtons = 1019 grams to cut
D: 15 Newtons = 1529 grams to cut
E: 22 Newtons = 2243 grams to cut
F: 30 Newtons = 3059 grams to cut

10. Wondering when you'll have to make these changes to your testing process? If you're in North America, don't stress: there isn't currently a specific deadline for retesting your gloves under the new ANSI/ISEA 105-2016 standard. However, the sooner they're retested, the better, since your gloves won't be certified under the new standards until the testing is conducted. Since the new EN 388 standard is still pending approval, a deadline for retesting doesn't currently exist. However, it is expected that there will be a mandatory testing deadline for European manufacturers in the future, so make sure you keep an eye out for it!

> One of the main changes is the increase in the number of cut levels from five to nine.

We hope you're feeling more informed about what the major changes to the standards are and why they're being made. Once they're fully implemented, these new standards will make a world of difference: they'll allow for a higher level of consistency among glove manufacturers, as well as greatly increase the accuracy of the testing processes overall. It is our hope that in the long run, these changes will result in a significant decrease in the number of hand-related injuries in the workplace as well.

Alex Carrillo-Hayley works in the marketing department at Superior Glove Works Ltd: the four-time Canada's Best Managed company and global leader in work glove manufacturing. For more information about Superior Glove's hand protection products or about the new glove testing standards, call (888) 428-1210 or visit www.superiorglove.com.

The cutting edge of **hand protection**

Form-fitting gloves and cut-resistant materials

Ansell

If you want to understand the evolution of hand protection in the workplace, look no further than the Electrolux plant in Memphis, Tennessee. Nearly half of the plant's 500 employees are women – well ahead of national numbers showing women making up about 27 percent of the manufacturing workforce. What's different in Memphis? It's a newer facility, and everything from automated operations to a brighter, more worker-friendly environment seems to be making the factory more appealing to women. We're seeing similar trends in factories around the world, even if growth in the U.S. is more measured.[1]

What does this have to do with hand protection? Practically speaking, it's creating a significant new demand for industrial gloves in smaller sizes. That may sound simple, but it's not. Few manufacturers are mass-producing gloves in sizes suitable for women, and the adjustments go beyond size and must account for variances in muscle fatigue and dexterity. Additionally, the changing nature of manufacturing jobs – including an increasing emphasis on final assembly as heavy assembly becomes increasingly automated – shifts the focus for gloves toward dexterity, tactility and comfort. And understand: Every innovation in hand protection is driven by a desire to improve the comfort, performance and protection of today's workers.

Enter ergonomics

Manufacturers are driven to design and engineer gloves that provide the protection necessary for the job, and that are compliant with current regulations. Minimizing hand fatigue and discomfort are important considerations, and new trends

The cutting edge of hand protection continued

around form-fitting gloves in lightweight materials with second skin-like feel are driving innovation in the market. Studies consistently show comfort is the No. 1 universal user need. This requires R&D teams to think differently about muscle performance, hand fatigue and the materials used in today's gloves.

Some categories of hand protection are obvious – such as cut-prevention or protection from fire or chemicals, for example – but there are other pieces to the hand protection puzzle that aren't as obvious. Nearly two-thirds of reported occupational injuries can be classified as repetitive stress reactions, and these can be debilitating and incredibly costly to both worker and employer. Consider this: Workers who suffer repetitive stress injuries, on average, require 23 days to fully recover—14 more than the average for all other injuries. And these injuries cost employers some $80 billion per year.[2]

Repetitive stress injuries are tied to certain tasks and the impact of those tasks on the muscles and surrounding joints. These injuries and conditions, such as carpal tunnel syndrome (the most common repetitive stress injury, affecting more than eight million people in the U.S. alone),[3] are real and can be chronic. Gloves play a factor. The question becomes: Are they helping to prevent these issues, or are they contributing to them?

Having the right glove for the job is critical. For workers handling oily parts, this means improving grip so less muscle effort is required to hold or use a tool or machine part. Alternatively, the wrong glove can exacerbate a problem by inhibiting motion. A certain design or material (such as leather, which is bulky) may make the movement required to complete a task more difficult. However, the same glove that works against certain movements may be perfectly suited for others. With that in mind, it is essential for R&D teams to understand the various tasks and movements of workers. From there, it's possible to design and engineer gloves that at least minimize any resistance from the glove and, at best, actually support and encourage the movements necessary for the job. That is the science of ergonomics, and it's a new frontier in innovation within glove design.

Cut protection

Improving the comfort and performance of gloves through the use of new materials and innovative, ergonomic design is critical for any number of reasons – not the least of which is simply improving the rate of compliance for workers needing hand protection. The evolution in comfort, however, cannot come with any sort of compromise in protection. Hand injuries in the workplace account for 13 percent of all industrial injuries, and cuts can be especially costly with an average price tag of almost $22,000 per incident.[4]

Employers are aware of the risks and increasingly are requiring their workers to wear gloves with cut protection. Unfortunately, many businesses are overprotective, insisting upon gloves with ANSI cut levels beyond the needs of the job. This can be counterproductive, because those gloves may be heavier, less comfortable and may not perform as well

The cutting edge of **hand protection** *continued*

as gloves better matched to the job. Asking workers to wear gloves ill-suited for the job can push them to remove the gloves altogether, putting their hands at greater risk and the plant in non-compliance.

It doesn't have to be this way. New in-house yarns specifically provide cut protection while reducing the cost of materials. Historically, many of the most effective cut protection gloves have carried premium price tags, mostly due to the cost of materials. With cost no longer a deterrent, these proprietary yarns and other advanced materials and designs make it possible to deliver lightweight, breathable gloves with multiple levels of ANSI cut level protection. These gloves also provide additional advanced features, such as silicon-free coating, dirt-masking colors, and improved grip and abrasion resistance.

Ultimately, the benefit of all this innovation is simple: There are more choices available to today's workers than ever before. The tasks men – and women – around the world are performing and the risks associated with them differ across industries. Today's fabrics are better, lighter and more breathable, allowing improved dexterity and tactility. New coating formulations last longer and improve grip and abrasion resistance. Today's multipurpose gloves are lighter, and deliver a more comfortable all-day experience, while disposable, single-use gloves are getting lighter and thinner while maintaining their protective qualities.

Bottom line: It is critical for safety managers to maintain their focus on compliance while providing their workers with the most optimal hand protection experience.

Written by Steve Genzer. Mr. Genzer is President and General Manager for the Industrial Solutions Business at Ansell, with responsibility for the worldwide business for Ansell Global Core Industrial Brands (HyFlex®, AlphaTec®, ActivArmr®) and the mechanical protection and chemical product portfolios at Ansell.

1 www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-mfg-women-in-manufacturing-2015-study.pdf

2 www.legalmatch.com/law-library/article/repetitive-motion-accident-statistics.html

3 www.legalmatch.com/law-library/article/repetitive-motion-accident-statistics.html

4 2014 USA National Safety Council 2014 INJURY DATA

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Grasp the **facts**

Knowledge is power when protecting hands from chemicals

By ANN VAN DEN BORRE and SRIN KUCHIBOTLA

It's impossible to know exactly how many chemicals exist in the world, but more than 60 million are registered with Chemical Abstracts Service system. About 80,000 are in use regularly worldwide, and that doesn't count all the combinations of those chemicals. These are overwhelming numbers, and the challenge of protecting workers against this massive universe can seem just as overwhelming.

The sheer volume isn't the only issue. Various chemicals and chemical compounds react in different ways to different materials used in gloves. Nitrile is effective against lubricating oils but not acetone, which is used to remove paint or nail polish. Neoprene is a good fit against many pharmaceutical agents, but ineffective against methylene chloride, another common paint-remover. In addition, there are chemical mixes that add increased complexity and require a chemist to identify the right protection.

The same variation is true of reactions to chemicals on the skin. Some you can see—irritation, rashes, or far more serious chemical burns. In 2014, there were 33,600 reported incidences of recordable occupational skin diseases, carrying an estimated price tag of $1 billion in the U.S. alone. Others aren't as obvious, but can be significantly more dangerous—certain chemicals absorbed through the skin can attack the nervous system, reach the bloodstream and do organ damage.

Clearly, protecting workers exposed to chemicals is critical, but complicated. Making the right choice for hand protection requires knowledge of the types of chemicals in the workplace and an understanding of which gloves—or combinations of gloves (we'll get to that)—are effective against those chemicals.

Common challenges in complex environments

Chemicals are everywhere, used in every industry. Whether it's paint used in automotive manufacturing, chemicals used in pharmaceuticals or manufacturing of beauty products,

Grasp the **facts** *continued*

pesticides, fertilizers, rubber and plastic formulation or simply chemicals used for cleaning virtually anything, chemicals are there. Regulations are robust when it comes to handling chemicals. Wherever workers come in contact with chemicals, they are going to be required to wear hand protection.

There are fundamental challenges—and truths—that are consistent whenever and wherever workers are required to wear gloves. Workers want three things from their gloves—comfort, performance and protection, probably in that order. Fail on the first two—if gloves are uncomfortable or make it difficult to do the job—and the worker will remove the gloves or find an alternative, even if that alternative doesn't provide the necessary protection. This is true even in environments where chemicals are present, and to ignore this truth is to invite non-compliance.

Chemical gloves are evaluated on three characteristics:

(1) Penetration—Simply put, if you pour water in the glove, how much makes it through?

(2) Permeation—Can a chemical, over time, work its way through? Think about helium escaping a balloon.

(3) Degradation—Do the chemicals break down the materials in the glove over time?

The impact of chemical penetration in terms of comfort and performance is fairly obvious—why bother with gloves at all if your hands are still getting wet?—as is degradation—no one wants to wear a glove that's falling apart. But permeability is a critical consideration when it comes to protection. Chemical gloves, by definition, must prevent chemicals from reaching the skin. But that works both ways. Some non-permeable gloves can be hot, sweaty and uncomfortable, leading workers to pull them off frequently or use a different type of glove that's more breathable but doesn't protect the hands the way it should.

Even in tightly regulated environments where chemicals are common, non-compliance trumps glove performance as the biggest obstacle to worker safety. Consider this: Across industries, 43 percent of workers don't know if the gloves they wear adequately protect their hands, according to one study. That's outrageous.

Understanding the options

Clearly, education and awareness are lacking, and that's compounded when dealing with millions of chemicals and various materials used that protect against them. Informed workers do not have to choose between comfort, performance or protection. Through new technologies, materials and creative approaches, glove manufacturers are finding ways to address the many needs of the worker while not compromising protection from potentially dangerous chemicals.

New technologies are leading to significant improvements in moisture management, either with the glove itself or in combination with a liner. These gloves improve grip, even in wet, oily conditions, and better manage sweat to keep the hands dry and comfortable. Double-donning remains a viable option in some cases—wearing a cut-protection glove under a chemical glove, or a thermal management glove under or over a chemical glove.

Grasp the facts continued

COMMON CHEMICAL GLOVE MATERIALS

Certain glove materials provide effective protection against specific chemicals.

Nitrile (buna, NBR)

Nitrile gloves protect against oils and greases (including animal fats); aliphatic solvents and some aromatic solvents They also protect against most agricultural pesticide formulations, and other chemicals. Nitrile is typically considered an "all-round" material.

Neoprene

Neoprene protects against a broad range of oils, oxidizing acids (nitric and sulfuric), polar aromatics (phenol and aniline), glycol ethers, greases and many other chemicals. Other types of gloves may offer better protection against some of these chemicals.

Poly vinyl chloride (PVC or vinyl)

PVC gloves protect against strong acids, strong bases, salt solutions and some organic chemicals.

Butyl

Butyl protects against moderately polar organic compounds such as aniline and phenol, glycol ethers, ketones and aldehydes.

Viton

Viton protects against aromatics, chlorinated solvents, aliphatics and alcohols.

Natural rubber (latex)

Natural rubber latex gloves provide excellent protection from bases, alcohols, and dilute water solutions of many chemicals, with fair protection against aldehydes and ketones.

Poly Vinyl Alcohol (PVA)

PVA provides a high level of resistance to many organic chemicals such as aliphatics, aromatics, chlorinated solvents, fluorocarbons and most ketones (except acetone), esters and ethers.

Sealed-film (laminate) gloves

Laminate is one of the most versatile materials available and protects against many chemicals, but does not offer dexterity, abrasion or grip.

But some gloves are designed to protect against chemicals while also providing abrasion and puncture resistance—deployed appropriately from fingertip to palm, all the way up the sleeve.

Knowledge is the key to ensuring workers are not only protected, but equipped with the best tools for their jobs.

Ann Van Den Borre is Senior Technical Manager Chemical Guardian at Ansell. With a Masters of Engineering Sciences in Chemistry, and 15 years of experience in PPE, Ann is a specialist in chemical resistance of barrier materials. Srin Kuchibotla serves as Director, Chemical Global Vertical Marketing and Business Development at Ansell with experience in B2B, CPG and food industries.

Defining **risk**

Assessing levels of abrasion, cut, tear & puncture exposure

By ANTHONY DI GIOVANNI

Risk is always present in a work environment. The challenge becomes understanding the risks and potential injuries, and ensuring proper protection is worn. With gloves, General Purpose or General Handling Gloves are often considered the solution because there is a need to be generally protected. But when you think about it, what is "General Protection?"

If the glove actually provides "General Protection," the acceptable and quantifiable standard covers abrasion, cut, tear and puncture. As it stands, if the levels for these four characteristics are comparatively low, then the glove is relegated to the "General Purpose" or "General Handling" category. But when do you need a work glove with generally low protection?

Defining risk

Even when handling boxes, one is exposed to a risk of injury by a cut or abrasion. That said, we have to be careful about how we are defining risk, including not defining it only by the severity of the injury.

For example, when handling boxes (to stay with our example), the selection of General Purpose over Cut Resistant gloves can be the result of underestimating the risk of injury and the associated costs.

Let's say the most reasonably severe injury one would incur handling boxes is an incision. Seemingly, a simple bandage solves this and the person can be back to work. But the fact is the real costs related to even a simple incision or abrasion wound are quite heavy. Take the cost of administrating first aid correctly: a visit to the company nurse, cleaning, sterilizing and bandaging the wound – you're looking at about $50 to $60 in direct and indirect costs combined.

Indirect costs, such as lost time and production as a result of the worker addressing their wound, should not be overlooked -- it often has a greater impact on the company's bottom line. The earnings to make up that cost are even more significant: $300 at five times earnings. Three or four of these per month, and the costs can mount quickly. But this is an example of a lower level hand injury. Per the Bureau of Labor Statistics (BLS), the average hand injury claim now exceeds $6,000. Unfortunately, when injuries happen, we can't dictate how severe they will be, and the impacts go beyond economics.

The goal is prevention. Only gloves with cut protection can help avoid these potential injuries.

Defining **risk** *continued*

A common selection

Leather gloves have traditionally been thought of as a solution and are still widely used today. Other than the known fact that they are bulky and lack tactile sensitivity, they also offer a false sense of protection. That's not to say they don't protect at all – they do well to protect against abrasions, but they are comparatively susceptible to cuts. Leather is treated animal skin and sharp objects can slice it easily, depending on the thickness. In addition to lacking dexterity, leather gloves do not offer the grip of coated gloves. This lack of grip can lead to an increased risk for cut injuries.

Remember: cut injuries generally don't occur from hands pressing against something. It's usually an object moving across the hand that leads to a cut or laceration.

So what is the solution?

An obvious component

Photos courtesy of Protective Industrial Products, Inc. (PIP)

Gloves that are dexterous, coated for an enhanced grip, and made with materials that are inherently cut resistant are crucial. While cut resistance is an obvious component of elevated protection, the other two aspects should not be overlooked. A glove that lacks dexterity may be removed to perform certain tasks, which removes the worker's protection. An enhanced grip makes it less likely something will slip out of or through the worker's hands, which could cause a laceration. There are multiple variables to take into account for each job or task to ensure the overall protection meets the needs of the workers, as well as the demands of the work to be performed.

Lowering the price point

But aren't these Cut Resistant gloves much more expensive than General Purpose gloves? Until most recently that was the case. However, advancements in engineered yarn technology are shifting this paradigm. Engineered yarns allow glove manufacturers to blend various fibers and materials of strength so cut resistance is elevated to higher cut protection levels. Affordable cut protection now can be provided for everyone, in every market.

Construction workers are most typically seen wearing those fabric/leather split palm gloves. Switching to coated seamless knits with engineered yarns enhance protection and allow them to more securely hold power tools as they handle sharp fasteners and sheet metal. Warehouse workers often wearing the economical General Purpose gloves can now feel more secure, even while handling those dangerous box cutters or razor sharp tape dispenser blades.

What's important is that we change our perception of "General Protection" and how it's achieved. Advances in technology will continue to provide enhanced performance and cost efficiency solutions to this persistent issue.

Anthony Di Giovanni is the Vice President of Global Marketing for Protective Industrial Products (PIP). He has more than 25 years of experience in Industrial Markets covering a range of Electrical, Chemical and Fire Resistant clothing. He joined PIP in 2013.

The SHOWA® **Brand Today**

Brand Refresh Equates to a Bright Future

In September of 2014 Showa Best Glove, Inc. announced that it had changed its corporate name to SHOWA, signaling its transformation into a globally unified company. This brand launch and unification stemmed from two distinct entities, and has led to a stronger, diverse, and multidimensional product offering tailored to meet the fluid demands of its end users.Today, the union is as strong as ever, and its visual identity is earning dividends.

A brief history

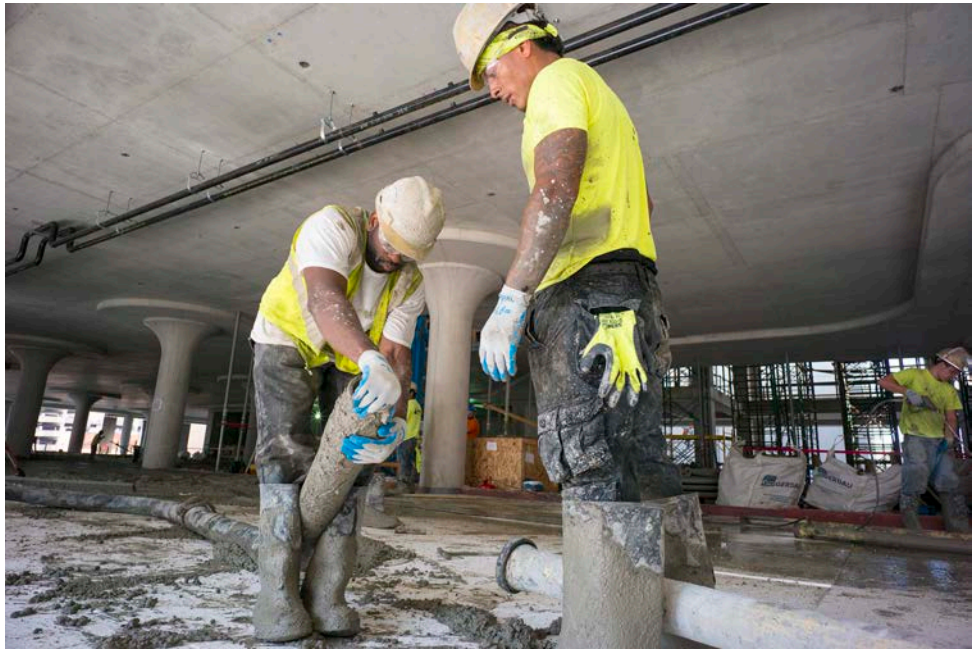
Showa Best Glove was the result of the successful acquisition in 2007 of Best Manufacturing, founded in 1951, by Showa Glove Japan, which began in 1954. Since the acquisition, Showa Best Glove has sold exclusively through its worldwide distributor network to end users in every industrial, medical and retail sector. It remains the only glove company that manufacturs nitrile disposable gloves in the United States.

Prior to the unionization, SHOWA manufactured more than 1,800 varieties of specialized gloves for the industrial, professional and home care industry sectors. The company's leading brands, such as ATLAS® and N-DEX®, continue to be offered under the SHOWA brand name. Other products moved under the SHOWA brand to simplify glove specification and ordering.

Today's brand evolution

The new name change, accompanied by a new brand mark and corporate identity, was intended to simplify the company's comprehensive hand protection portfolio under one unifying brand to facilitate easier customer ordering, manufacturing and global distribution. Says SHOWA Director of Marketing, Gil LeVerne, Jr., "Our brand equity has never been stronger, stemming from the simple fact that our product lines, combined, have more traction and resonance in the marketplace than ever before. We have a singular,

The SHOWA® Brand Today *continued*



identifiable brand that matches the quality of our products."

LeVerne goes further, "In addition, our time and investment in enhanced hand protection and innovation, particularly in the areas of sustainability and customer-focused R&D have enabled us to create some groundbreaking technologies such as EcoBest Technology® enabling us to develop the industry's first biodegradable disposable nitrile glove (the SHOWA N-DEX6105PF), cut-resistant Hagane Coil® technology, and TEMRES technology to name a few. This very simply proves our value proposition which lives in our tagline 'Always Innovating. Never Imitating.'"

Said SHOWA's former President/COO, Bill Alico in 2014, "As SHOWA, we are uniquely positioned to deliver innovation, performance, sustainability and precision quality manufacturing that ultimately fortifies our ability to support our global distribution network. That has always been our top priority and this transformation continues our commitment to always providing the highest quality service and leading-edge technology to our customers."

Today, two plus years later, this matra is top of mind. SHOWA continues its legacy of innovation to distinguish the company as a global leader in hand protection. With 58 patents owned and more than 100 researchers dedicated to developing new, environmentally sustainable ways to protect hands at work, SHOWA is recognized for its massive portfolio of specialized gloves for the industrial, professional and homecare categories. SHOWA pioneers the quality, performance and protection to give ordinary hands extraordinary abilities.

As a fully owned, 100% integrated manufacturer, SHOWA creates all their own machinery, yarns, coatings, polymers, designs and hand formers – controlling every step of their process, every step of the way – for 100% quality control at every level.

SHOWA has nine production facilities around the globe and approximately 5,000 employees worldwide.

To learn more, visit ShowaGroup.com.

SHOWA®

Always Innovating. Never Imitating.

ENGINEERED WITH EBT:
SHOWA® 728
SHOWA® 731
SHOWA® 4552
SHOWA® 6110PF (shown)
SHOWA® N-DEX® 6105PF

PROTECTION AND PRESERVATION IN ONE

In 2013, SHOWA introduced our revolutionary Eco Best Technology®(EBT) along with the world's first biodegradable nitrile single-use glove. Our investment in sustainability is our commitment and, today, we offer five respective products manufactured with EBT. Whether the job calls for single-use gloves, multi-purpose protection, or resistance to chemicals and liquids, SHOWA protects both your hands and the vitality of our environment.

Discover more about EBT and our revolutionary products at SHOWAgroup.com.

Grasping the **coefficient of friction**

Gloves with a good grip reduce exertion and fatigue

By ERIC JAEGER

Your workers who wear gloves are required to wrap their hands around a wide variety of surfaces — tool handles that can be made of wood, steel, or rubber; and items as varied as corrugated boxes, sheet metal, glass plates, drywall, rebar, ladder rungs, roof shingles, cement blocks, concrete or steel pipes, hot brake pads, traffic cones, lumber, steering wheels, welding torches, braided steel cable and many more.

Plus, these surfaces can be smooth or rough, burning hot, frozen cold, dusty, damp, wet, muddy, coated in crude oil, drilling lubricants, or transmission fluid. All the while, your workers are expected to be in control of their tools, equipment and environment. That is to say, they must have a strong grip on an enormously wide variety of surfaces, with a range of potential surface contaminants, under an array of different environmental conditions. Grip is not just important, it's critical — to your worker's ability to perform their job, their personal safety, and the safety of those around them.

Evaluating protection

As a safety professional, you have a variety of tools to evaluate glove protection such as ANSI/ISEA 105 and EN standards for abrasion and cut resistance, heat and flame resistance, protection from welding sparks, etc. You can request this data from the manufacturer.

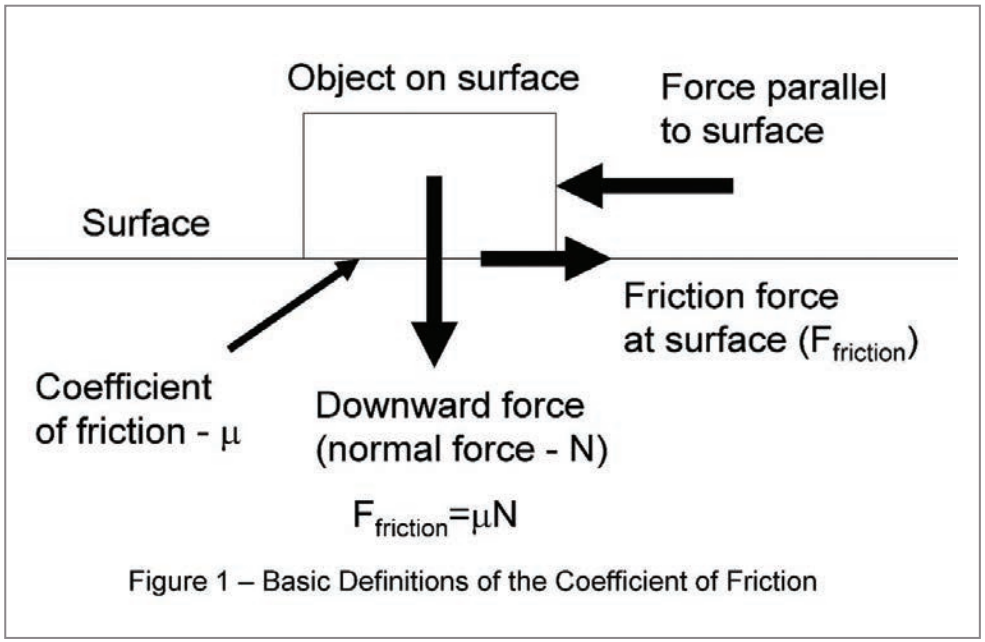
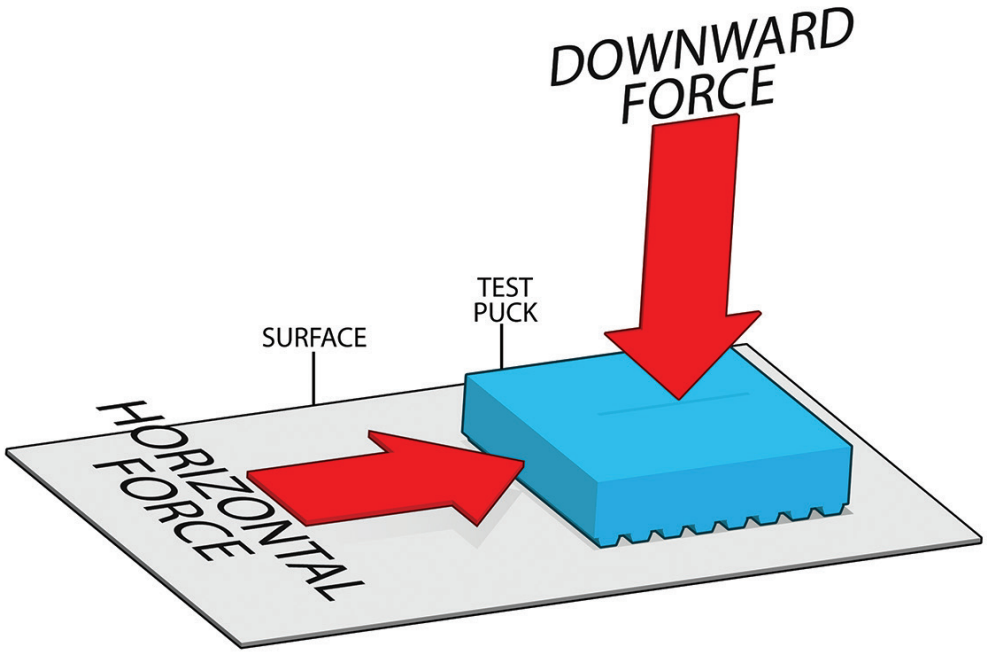


Figure 1 – Basic Definitions of the Coefficient of Friction

But what good is a protective glove if your employees can't hold on to their tools and equipment? More importantly, how do you evaluate the grip of a glove, when no formalized grip standard exists? Have two workers pull on opposite ends of a pipe soaked in oil? It's a start, but that's hardly scientific. On-the-job trials are the ultimate determining factor — but with hundreds of gloves to choose from, you need a tool to narrow down your options to the two or three best glove candidates before commencing a field trial.

Grasping the coefficient of friction continued



Evaluating grip

You can start by asking glove manufacturers for comparative grip testing — how do they rank their gloves according to grip, on different surfaces and in varying conditions (dry, wet, oily, etc.)? Some manufacturers have developed in-house grip tests, and have tested a variety of glove palm materials on different surfaces and surface conditions. In fact, you can provide glove manufacturers with your particular "grip needs;" identify the surfaces and surface conditions that your workers deal with on a regular basis, and request that the manufacturer scientifically evaluate their gloves under your particular conditions.

What methods are available to evaluate grip? Most people think of a pull test or a torque test — i.e., two people pull or twist against each other on a pipe, with either water or oil coating the surface. Or an employee is asked to swing a hammer and then evaluate how much they had to squeeze to keep the hammer from flying out of their hand. The problem with these "tests" is the reliance on humans with a wide range of individual grip strength, muscle tone, fatigue, bone and joint anatomy, medical history, etc.

Explaining the coefficient of friction

A more reliable and scientific test will evaluate the coefficient of friction of a glove palm or fabric on a particular wet, dry or oily surface. The safety shoe industry has used standardized, machine-controlled coefficient of friction testing for many years to evaluate shoe grip on wet or oily floors. This same test method can be used to evaluate glove grip.

Here is a brief explanation of Coefficient of Friction (CoF):

CoF is a scientific measurement that evaluates the amount of force required to push an object across a surface, in the presence of a downward force pressing the object onto that surface. CoF is calculated as the ratio of these two forces — the required horizontal force (the force required to push the object) divided by the vertical force (the downward force pressing the object onto the surface). See the diagrams in this article.

This is a scientific measurement of the amount of friction between the bottom of the object and the surface it is in contact with. If the required "pushing" force is small compared to the downward force, then there is a small amount of friction,

Grasping the coefficient of friction continued

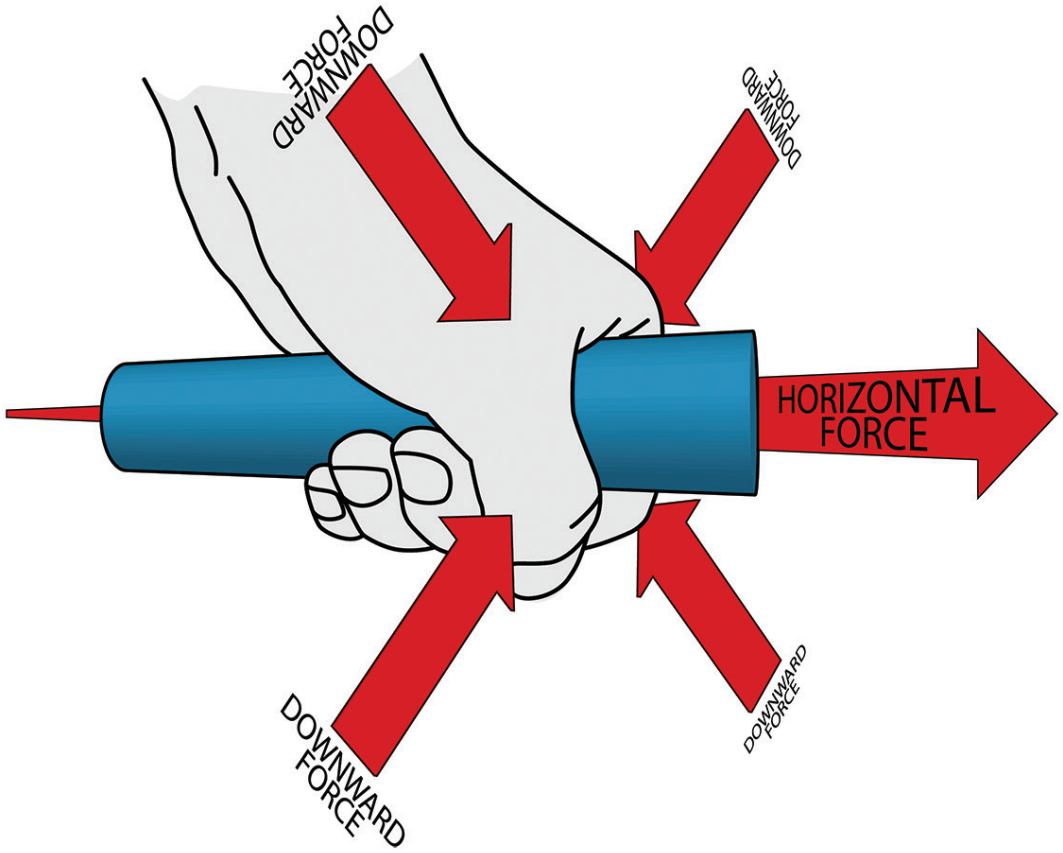
resulting in a low CoF value. On the other hand, if a large force is required to push the object, then there is a large amount of friction and a high CoF value.

Reducing hand & arm fatigue

So how does this test translate to glove grip? It is very straightforward — the higher the CoF value for a glove, the more grip that glove will have (on the particular surface it was tested). Wearing gloves with a high Cof value will reduce the potential for tool or equipment slippage, and enable the user to exert less energy squeezing or holding objects. This also results in a considerable reduction in hand and arm fatigue, which in turn further reduces the potential for dangerous incidences.

Some research has shown a tremendous variation in glove palm CoF values, depending on the surface and surface contaminants – gloves designed for dry grip could have a CoF of up to 1.8 on dry steel, but less than 0.3 on wet steel or 0.1 when coated in oil. Some new gloves have come to market that are specifically designed for grip in wet and oily environments, yet very few are scientifically tested for CoF to prove their grip.

Finally, remember that grip data is the starting point – it will help you narrow down your choices for which gloves to put in the field. The ultimate determination should always be made based on real world testing in the field.



Eric Jaeger is VP, Research & Development for Ironclad Performance Wear.

One size **doesn't fit all**

Break with tradition and match gloves to hazards

By ANDY OLSON

In 2014,* 137,440 hand injuries resulted in an average of five days of missed work. While that might not sound like much, it means a project was at least one worker short for an entire workweek. Another 10,710 workers suffered bruises and hand contusions in 2014, missing four days of work on average. These absences likely required other workers to step up and work longer hours so the projects finished on time. Fortunately, technical work gloves – and the workplace policies requiring their use – are becoming more popular across the country resulting in better protected and more productive workers.

Skin is no match...

A common, traditional work glove is a one-size-fits-all leather "driver." But this type is often bulky and doesn't provide sufficient dexterity for precise tasks that involve using tools, manipulating small parts like screws and nails, or pushing small buttons on a piece of equipment or a touch screen.

Stats show that simply wearing gloves of any type can prevent many hand and finger injuries. Thick as skin can be, it's no match for certain workplace hazards. At the very least, work gloves can protect against minor site hazards like splinters and other protrusions that cause lacerations, as well as rough surfaces that leave abrasions. At the most, they

Photo courtesy of Ergodyne

can prevent crushing blows, deep cuts, and career-ending conditions like HAVs.

But workers in these extreme conditions aren't typically

One size doesn't fit all continued

the ones who need convincing. Workers who find their tasks run-of-the-mill may not see the need to wear gloves. Even in these common scenarios, however, donning a glove makes a distinct difference.

- Handling Materials: Whenever a worker moves materials on a jobsite, they risk their hands being cut on the sharp edges of metals, glass, or plastic shards, and from splinters on broken/damaged materials.
- Tool Use: Using gloves with tools results in a better grip on many tools with wooden or metal handles.
- Adjacent Work: When side-by-side work poses a potential flying object hazard, the dorsal (i.e., top) part of the hand should be covered to protect it from cuts, abrasions, burns, and more.

Competing hazards

Everyday work gloves should be flexible and allow workers to feel the materials, tools, and equipment in use. Gloves shouldn't negatively impact precise tasks that require pinch grip. To enhance hand and finger dexterity, it is important that workers wear a glove that fits securely and utilizes materials that are both lightweight and durable.

Many jobsites are becoming more technologically-advanced with paperless documentation, daily progress photos, and instant communication. A glove that can stay on while a worker taps and swipes on an electronic device saves precious seconds and makes for more efficient work. It also prevents the worker from having to remove the glove to operate the device, which can leave them exposed both then and if he or she neglects to put them back on.

Also something to note: Worksites are becoming increasingly hot in both temperature and the amount of heat generated by worker exertion. Instead of working with bare (and sweaty) hands, workers should wear gloves made of durable yet breathable materials. This will cut down on workers removing their gloves because of sweat and yet again, leaving them exposed to injury.

The good news: Providing workers with well-fitting, technical work gloves, although an investment, should result in more regular compliance and as a result, fewer injuries. When workers don't like the gloves they are given, they simply won't wear them. And that's not good for anyone.

Choosing for cut protection

Work done by glaziers and sheet metal workers, or any other specialty tasks, may require cut protection. In those instances, workers should wear daily work gloves that have met performance standards for cut protection. ANSI/ISEA 105 is the standard primarily used in North America. Another standard is EN 388, which is used in Europe, South America, and Mexico. The EN standard is also widely recognized in the U.S. and Canada.

Cut resistance is a key performance area measured by both the ANSI and EN standards. Though they use different test methods, both are designed to provide a baseline indication of the level of cut and slash protection provided by a glove.

One size doesn't fit all continued

Consulting any glove's manufacturer to understand both the type of testing that has been done and the level of protection it provides is always best practice, as is conducting a hazard assessment to determine the level of cut protection needed for the application where gloves will be worn.

Both the ANSI/ISEA 105 and EN 388 standards include other mechanical risk tests to measure a glove's resistance to abrasions, punctures, and tears. A certified lab must conduct the tests for a glove to have an EN 388 mark. This mark includes the corresponding numerical Performance Levels for abrasion, blade cut, tear, and puncture to easily identify how the glove fared in the testing process. These EN Performance Levels are not necessarily interchangeable with ANSI/ISEA 105 Performance Levels; however you can always count on the number 1 signifying gloves appropriate for nuisance injuries like abrasions and minor cuts while higher numbers signify a higher level of protection. The ANSI/ISEA 105 standard includes a Performance Level of 0, which means minimal or no protection at all.

Depending on your location or your favorite glove manufacturer, both the ANSI/ISEA 105 and EN 388 Performance Levels may be displayed on a pair of gloves. Since performance identification on gloves is not required in North America, buyers may see only the EN 388 Performance Levels displayed, depending on the glove manufacturer.

The future

More and more manufacturers are stepping up and creating everyday work gloves with the worker in mind. Even the simplest of tasks should have a glove that meets the needs of the hazard and worker. Whether it's cut protection, breathability, touch screen capabilities, or dexterity, safety professionals and project supervisors now have a wide array of options to not only keep their workers' hands safe but get the multiple aspects of their job done as well. Because ultimately, providing a more comfortable and job-specific glove will keep gloves where they should be – on the worker.

Andy Olson has been an Ergodyne employee for seven years and is responsible for the protection product pillar. Andy serves as the company's ISEA representative on the hi-vis apparel, hand protection, and eye protection standard committees. He has authored numerous articles that have been published in safety trades on topics ranging from hand protection and worker visibility, to protection for worker-generated head injuries and eyewear compliance. He also trains distributors and end users nationally on the ANSI/ISEA 107 hi-visibility standard and other relevant safety topics.

*Most recent statistics available

Resources

1. BLS Nonfatal Occupational Injuries and Illnesses Requiring Days Away From Work, 2014.

http://www.bls.gov/news.release/pdf/osh2.pdf

2. OSHA Recordkeeping Fact Sheet, 2014.

https://www.osha.gov/recordkeeping2014/OSHA3745.pdf

How to save money with **custom-designed protective gloves**

Now you can order a protective glove like you order a good steak: Done exactly the way you want it.

Contrary to popular belief, it's not expensive to have a glove designed to solve the very specific demands of your process, equipment or application. In fact, there are many ways a custom glove can save your company money.

1. Cut cost by design. Glove cost is impacted by everything from yarn composition to product design, fabrication choices and value-added finishes. One or more of these elements may be changed to provide new end-user benefits, including savings.

One striking example was the introduction of Advanced Technology Armor® (ATA®) in 2005, which doubled the level of hand protection attainable while cutting the cost per glove by 30 percent. With this proprietary development in yarn technology, US manufacturer Worldwide Protective Products generated a sea change in the industrial glove market.

Today Worldwide has earned a reputation for its willingness to "go off catalog" to create a customized product at the request of an end user – even in relatively small quantities.

2. Reduce reorder rates. Consider the sheer number of gloves you're going through. Buying large quantities of nearly disposable gloves adds up, even if the cost per pair appears cheap.

WORLDWIDE® PROTECTIVE PRODUCTS

This was the case with a major US food processor using inexpensive, imported string knit gloves. A new source of raw fiber provided the solution this time, and Worldwide produced a low cost, USA made glove that delivered three times the usable life. In addition to overall savings, the processor took advantage of the very reasonable lead times for the domestic gloves and reduced on-hand quantities.

3. Eliminate manufacturing issues. Could something as seemingly small as a glove slow things down on your production line?

A leading auto manufacturer using the hands on vehicle inspection technique – where workers slide their hands over the raw steel chassis to detect imperfections before the vehicle is painted – was recording a high number of cuts and tears to the hand.

Solving the problem was made more complex by the need for a cut-resistant glove that would also be lint free. By taking a fresh approach to everything from fiber composition to finishing and packaging, Worldwide Protective Products was able to deliver both tactile sensitivity and cut resistance and, according

How to save money with **custom-designed protective gloves** *continued*

to their reports, the lowest lint levels ever seen by one of the busiest auto plants in the US.

4. Minimize recordable injuries. Given the technology available today, it's not unreasonable to set a zero-injury goal. Sometimes the smallest details can reveal a major solution.

When the safety director of a leading poultry processor shared hand injury records, Worldwide mapped where each injury landed to uncover patterns of high frequency. This map led to the strategic placement of Kevlar® fabric patches onto a cut-resistant knit glove, and a significant, long-term reduction of injuries at the plant.

5. Stamp out redundancy. After years of trying different gloves and never being fully satisfied, a metals fabrication company settled for workers wearing a cut-resistant glove as a liner under a leather glove. But injuries persisted, and it was difficult to manage the divergent purchasing and laundering cycles of the 2-glove system.

Worldwide developed a single-glove solution by lining a split leather and canvas shell with ATA® cut-resistant knit. The resulting glove delivers a 6+ month lifecycle, a simpler laundering process, and increased cut protection by 2 full ANSI levels. In fact, the manufacturer's recordable glove-related hand injuries were reduced to zero.

The bottom line: you never have to accept "good enough" when there's a manufacturer who's ready to work with you.

Share your safety challenge with Worldwide Protective Products. Call Al Williams at (877) 678-4568 today.

Your safety challenge
Our custom solutions

Do you have a unique hand safety challenge – something about your process, equipment or application that makes the usual safety products fall short?

Worldwide provides custom design and fabrication at no extra charge.

We'll put our hand safety experts to work solving the special demands of your application, modifying anything from raw material to product design, fabrication options and value-added finishes.

All to keep your workforce safe and your costs under control. For more information, call Al Williams today.

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Custom design and fabrication at no extra charge

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wwprotective.com

Function, feel & protection

Glove innovators pursue performance & sustainability

By GILBERT LeVERNE, Jr. and TODD KLUEGER

Innovations — development of new and improved materials and advancements in manufacturing processes — have made work and specialty gloves stronger, more flexible, more durable and more versatile than ever before. They more effectively protect hands against harsh, extreme-temperature, and high-risk work environments.

For the first time, biodegradable nitrile gloves, made of organic materials, break down more readily in landfills. New polymers, coatings and hybrid fabrics increase functionality, comfort and gripping ability, and lessened hand fatigue. Better technology is creating more waterproof, oil-impermeable and perspiration-preventive gloves to keep hands drier and cleaner; high-tech gloves for clean-room applications; more cut-resistant gloves made of Kevlar® coil fiber that don't sacrifice performance; and more chemical-resistant gloves that handle grease, oil and extremely abrasive liquids such as acids, caustics and solvents.

Photo courtesy of SHOWA

Many manufacturers invest heavily in research and development to create custom-engineered gloves for very specific uses and jobs – such as contractors, carpenters, HVAC technicians, welders and electric utility workers. And they provide protection from a myriad of hazards, such as arc flash. Innovations allow workers to perform their tasks better, more safely, with more dexterity, and with gloves that last longer.

Hybrids and sustainability come to the fore

Hybrid fabrics, comprised of cutting-edge yarns and other fabrics, deliver lighter-weight gloves to protect workers against multiple dangers – from chemical substances to lacerations, cuts and punctures. Innovations includes thermal plastics and resins for pinch and impact protection and greater chemical and cut resistance, and smart fibers to detect certain chemicals.

Technology improvements make gloves feel better on the hands and are thinner and more touch-sensitive. Seamless, ergonomically-sound liners make gloves fit more snugly and grasp objects more evenly; have non-slip grips for better tactility when exposed to mud and oil; and greatly reduce hand fatigue in oily, chemically pervasive

Function, feel & protection continued

conditions. New gloves also eliminate irritation or allergic reactions associated with latex, nitrile or neoprene polymers.

Sustainability is a growing consideration, too. Some manufacturers use extended-life materials that reduce carbon emissions from manufacturing and delivery. Use of glove liners and coatings made from virgin raw materials cuts down on chemicals. Environmentally friendly bamboo fibers – which, unlike synthetic fibers aren't petroleum-based – have made their way into the gloves' shell. Demand is growing for post-consumer recyclate (PCR), which consumes less energy and natural resources, and for biopolymer fibers, made of starch, cellulose, and polylactic acid and that are found in disposable products.

Ultimately, the idea is to create one glove that can unfailingly handle as many critical tasks as possible.

Distinguish authentic innovation from imitation

Truly groundbreaking developments in the glove industry emerge from companies that track and anticipate industry needs, and reflect those changes with innovative R&D. As production and delivery processes become more sophisticated in segments such as oil and gas extraction and transport, chemical refining, mining, and medical laboratory processing and testing, glove manufacturers need to maximize performance and protection properties for designated operations. Innovative glove manufacturers recognize this is a constantly evolving imperative and provide the necessary R&D to keep pace with it.

Gilbert LeVerne, Jr., director of marketing for glove manufacturer SHOWA in the Americas and Oceania, describes this working definition of the process:

"Authentic innovation is creating a product that is unique, potentially patentable, and offers more protection and additional tactile sensitivity, while maximizing comfort for the user. It may also be founded in a chemistry that allows normally non-biodegradable gloves to be biodegradable in certain conditions, such as an active landfill.

"Copycats and knock-offs truly don't understand this definition."

Innovation comes from manufacturers whose multiple patents are the foundation for their products. A culture of creative and patient developmental design exists subject to constant challenge and testing under real-world conditions.

Development of the world's first biodegradable, disposable nitrile glove came from a corporate commitment to environmental preservation and social responsibility, and rigorous intellectual property standards. Consultations with glove users identified the need to address allergic sensitivity to latex rubber.

Safety always is top-of-mind with innovative manufacturers. The National Safety Council reports that slices, cuts and lacerations account for almost 30 percent of time and productivity lost to work-related incidents, and 80 percent of those incidents involve hands – the most frequently injured body part in jobsite accidents, according to the U.S. Bureau of

Function, feel & protection *continued*

Labor Statistics.

Some innovators provide customized safety solutions that optimize customers' cost performance. You start with a comprehensive hazard assessment, identify risks in the workplace, and establish a benchmark to measure effectiveness over time. Service experts provide ongoing assistance to ensure the customer gets the most from the investment long term.

Companies that make personal protective equipment, including gloves, are taking a more holistic approach to improve sustainability. Every step of their product's journey is improved, from raw materials and production, to transportation and logistics, customer usage and disposal. Imitators may continue to invest indefinitely in fossil materials such as polyester, polyamide and polyethylene. Innovators will use more natural fibers such as hemp and linen. They'll also look to 100-percent post-consumer waste and recycled materials for glove packaging purposes.

Photo courtesy of SHOWA

Look for "additional" investments in cut, puncture and impact-resistant gloves and products for the oil and gas industry "despite the downturn in the energy sector," according to LeVerne. Redundant product lines could be thinned out to make way for a new generation of innovations.

Authentic glove innovators, in the end, are unfailingly sensitive to emerging and shifting functional, convenience and safety challenges that gloves must meet. Their mission, as one industry leader puts it: "to give ordinary hands extraordinary abilities."

Gilbert LeVerne, Jr. is director of marketing for glove manufacturer SHOWA in the Americas and Oceania. Todd Klueger is Product Manager for SHOWA.

Beyond **arc flash protection**

Protect hands from all possible exposures

By BILL SOELLNER

In 2012, the National Fire Protection Agency (NFPA) changed the way personal protective equipment is rated. Instead of only having a Flame-Resistant (FR) rating, now there's an Arc Flash rating as well (denoted as AR, which stands for "Arc Rated"). This change evidently came about for a reason: in recent years, there has been a staggering increase in the number of arc flash incidents in the workplace, with many resulting in fatalities.

Although this type of hazard affects many workers each year, what an arc flash? An arc flash occurs when an electrical current jumps from the desired electrical path, and travels through the air from one conductor to another. When this happens, anyone who is in the path of the discharge, or nearby, can become badly injured – or, frighteningly, even killed.

The best way to prevent these types of injuries is to educate yourself about arc flashes, their common causes, as well as how you can protect your workers from these types of excruciating electrical burns. Depending on the industry you work in, there are a large number of factors that can cause an arc flash to occur within your workplace. Make yourself aware of these risks and you can personally help minimize the occurrence of arc flash within your workplace.

In workplaces with high voltages or current machinery,

Photo courtesy of Superior Glove Works Ltd.

some of the most common causes of arc flashes include the following: airborne dust particles that can provide a path for electrical currents; worn out or thinning insulation; corroded contacts; dropped or improperly used tools; improper or incomplete installation of equipment; and accidental human contact due to inappropriate gloves or other PPE.

The fact that arc flashes often occur because workers are wearing the wrong gloves (or other types of PPE) is something I'd like to draw your attention to in this article. It's not only a huge factor in the frequency of arc flash occurrences, but it's also extremely preventable.

The right gloves

In order to help minimize the risk of arc flash as well as the painful aftermath that accompanies it, I've compiled a list of

Beyond arc flash protection continued

everything you need to consider during your search for arc-rated hand protection. Here are my top six tips to help you ensure that your workers are wearing the right pair of work gloves.

1. Ensure employees are wearing flame-resistant PPE.

Though it may seem obvious, wearing gloves or other PPE that will burn, ignite, or fail to prevent heat damage is one of the absolute worst things that your employees can do in workplaces where arc flashes are a threat.

2. Anyone who works where sparks or flames are present should wear flame-retardant (FR) gloves.

It's crucial that if your workers are going to be exposed to sparks or flames while they're on the job that they wear flame-retardant gloves so that their hands are properly shielded. According to section 1910.193 (a), OHSA requires employers to provide appropriate hand protection to employees based on the hazards that they'll be exposed to in their workplace; this includes all types of burn and flame hazards. Ensure all employees know it's mandatory to wear the assigned PPE to help to ensure worker compliance.

3. Currently, the ASTM F2675-13 test is the standard method for determining the arc ratings of gloves designed for electrical arc flash protection.

Workers operating meters should always be wearing rubber insulated gloves with some sort of protector glove over top. (At the moment, the ANSI/ISEA 105 method does not include arc flash testing.) Also, when you're looking for an arc-rated glove, ensure that manufacturers are comparing glove options by the same types of standards and principles. This ensures you'll be able to accurately determine which pair of gloves will better protect your employees. Apples to apples, oranges to oranges, right?

4. Anytime there is a risk of exposure to a shock hazard, workers should always be wearing a rubber insulating glove.

For this reason, workers operating meters should always be wearing rubber insulated gloves with some sort of protector glove over top. Unfortunately, meter malfunctioning is a common cause of electrical burns. Because of this, it's important that workers using meters wear rubber insulating gloves underneath their protector gloves, since the rubber will block the electricity from passing through to their hands and shocking them. OHSA also recommends that workers wear a protector glove over top of the rubber insulating gloves.

(Bonus tip: If workers require rubber insulating gloves, check with the manufacturer to ensure that the protector gloves will fit over top of the rubber inserts. Otherwise, your workers' hands will be protected, but the gloves you've chosen could affect their job performance – which you definitely don't want.) As well, whenever a shock hazard is present, it's always preferable to wear gloves that are voltage-rated.

Beyond arc flash protection continued

5. Consider all of the hazards – not just the arc flash-related ones.

Today, certain types of leather gloves are often worn on top of these rubber inserts, but in the future, these gloves might be made from other materials. Although leather gloves provide good protection from arc flashes, they aren't necessarily the best choice for comfort, cut protection, or chemical protection. It's important to ensure workers' hands are not only protected from arc flashes, but from all of the other hazards that they may come across during their workday as well. The best way to do this is to evaluate your workplace and its inherent risks. Otherwise, though you may have taken the time to prevent one type of injury, there's a good chance that employees could end up suffering from one of a different nature.

Evaluate if workers require other arc-rated PPE, in addition to arc-rated gloves. Depending on the severity of the risk of arc flashes in your workplace, arc-rated sleeves can be worn alongside gloves for additional arc flash protection. The more proper coverage, the better – right?

I hope that these tips will help reduce the risk of arc flashes, and as a result, help you make your work environment a much safer place. For additional information about hand protection options for specific applications, contact a glove expert.

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Greater precision **and accuracy**

What updated standards will mean for selecting gloves

By JILL A. CLEMENTS

To help guide PPE purchasers, both ANSI and the European Union (EU) have developed standards for cut-resistant materials.

The U.S. standard is ANSI/ISEA 105 ("American National Standard for Hand Protection"), which rates gloves and other cut protective clothing on a consistent numeric rating scheme for mechanical, thermal, chemical, dexterity, and other performance criteria.

Although the use of the ANSI/ISEA selection criteria is not mandatory in the United States, most safety managers choose to follow it in selecting the right protection for their employees.

The EU standard of EN 388 ("Protective Gloves Against Mechanical Risks") rates gloves and other cut protective clothing for abrasion, cut, tear, and puncture resistance. Beyond the European Union, this standard is also recognized globally.

While these standards provide a useful guide, they are not interchangeable. As a result, there is a growing need for a more consistent testing method and ratings that take into account recent advances in cut-resistant yarns and technologies and provides more specificity when choosing PPE.

Why change is needed

ANSI/ISEA 105: In recent years, as new yarns and new technologies have been developed, performance of cut-resistant gloves has improved tremendously. There are now more options in the 1500-

ANSI/ISEA 105 Standards

Old Standard		New Standard	
Load (grams)	ANSI/ISEA 105-11	Load (grams)	ANSI/ISEA 105-16
<200	0	<200	–
201-499	1	201-499	A1
500-999	2	500-999	A2
1000-1499	3	1000-1499	A3
		1500-2199	A4
1500-3499	4	2200-2999	A5
>3500	5	3000-3999	A6
		4000-4999	A7
		5000-5999	A8
		>6000+	A9

Items highlighted in yellow represent the expanded ANSI/ISEA cut standards.

Figure 1: Previous vs. New ANSI/ISEA 105 Levels

Greater precision and accuracy continued

3500 grams range and above 3500 grams. The increased granularity within the new levels allows glove manufacturers to identify gloves with greater degrees of cut protection than before.

EN 388: The proposed changes to the current EN 388 standard focus on improved reproducibility, specific to the cut and abrasion parts of the standard. With this focus, the EN 388 has adopted the ISO 13997 TDM test as a more reliable test method. Although the Coupe test has been retained for now, it may be removed at the beginning of the next five-year revision cycle. Back of hand impact protection requirements have also been included.

What you need to know about the new standards

ANSI/ISEA 105: The updates to the ANSI/ISEA 105 standard were focused primarily on the cut performance portion of the standard. The new ANSI/ISEA 105-16 version contains an increase in cut performance ratings from five to nine levels, as shown in Figure 1. The new standard will reference only the TDM Test Method, based on the ASTM F2992-15 standard, while discarding the CPPT method.

Although the use of the ANSI/ISEA selection criteria is not mandatory in the U.S., most safety managers use the standard as a guide to provide the right protection for their employees. Because glove manufacturers are not required to change from the ANSI/ISEA 105-11 to the new ANSI/ISEA 105-16 standard within a certain timeframe, there will be a mix of identifications of performance in the marketplace.

Additionally, there is also a test method in the standard for resistance to puncture from a hypodermic needle. Previously, puncture resistance was measured with a stylus, but the committee now recognizes an increasing need to test for hypodermic needle resistance for specific applications.

EN 388: Proposed changes would affect the EN 388 standard in a number of significant areas. These include acceptance of the ISO 13997 (TDM) cut test method, amending the Coupe test to take into account dulling of the blade, change of the abrasive paper, and the addition of an impact protection threshold, among others.

Use of the ISO 13997 (TDM) test as an equivalent method is a major step. Under this change, cut performance achieved using the TDM will be more aligned to the ANSI/ISEA 105 method. Levels rated though the TDM method will be lettered (A through F) to avoid confusion with the Coupe method, which will still use numerical labels.

Calibration of the TDM machine is also improved. Control over sharpness of the blade has been enhanced, and an equation has been created to determine the maximum number of cycles at which test should be stopped to measure dulling. If dulling is detected, the TDM test becomes the new reference test method. Results obtained from the Coupe method may optionally be reported, but an addition to the “Instructions for Use” or the manufacturer’s instructions must state there was dulling of the blade, the Coupe test results are for reference only, and the TDM test results are the final report of the material’s performance.

Greater precision and accuracy continued

The abrasion test segment has changed the type of abrasive paper to be used, which will result in lower performance for an equivalent textile, potentially by up to 1 level. Figure 1 shows what the changes may look like for a typical test.

Any changes to EN 388 will be compulsory, which is different than that of ANSI/ISEA. Even with the addition to the EN rating system of the ISO13997 method, there will continue to be different identification markings and performance rankings on gloves tested using the EN388 method compared with those tested by the ANSI/ISEA method. The use of new markings under the ANSI/ISEA method, the addition of new markings for the CE ratings under the EN388 test method, and the continued use of different types of test equipment between the two standards will continue to promote confusion in the marketplace around proper PPE choices.

When will changes take effect?

In North America, the new standard went into effect at the end of January and is already being used by industry members. The new ANSI/ISEA 105-16 can be downloaded from the ISEA website at: https://safetyequipment.org/standard/ansiisea-105-2016/

In Europe, the proposed EN388 changes are currently out for ballot, and members have until early June to return their votes. Given a positive vote, the new standard should become effective at the end of June or early July, with publication of the new standard shortly thereafter.

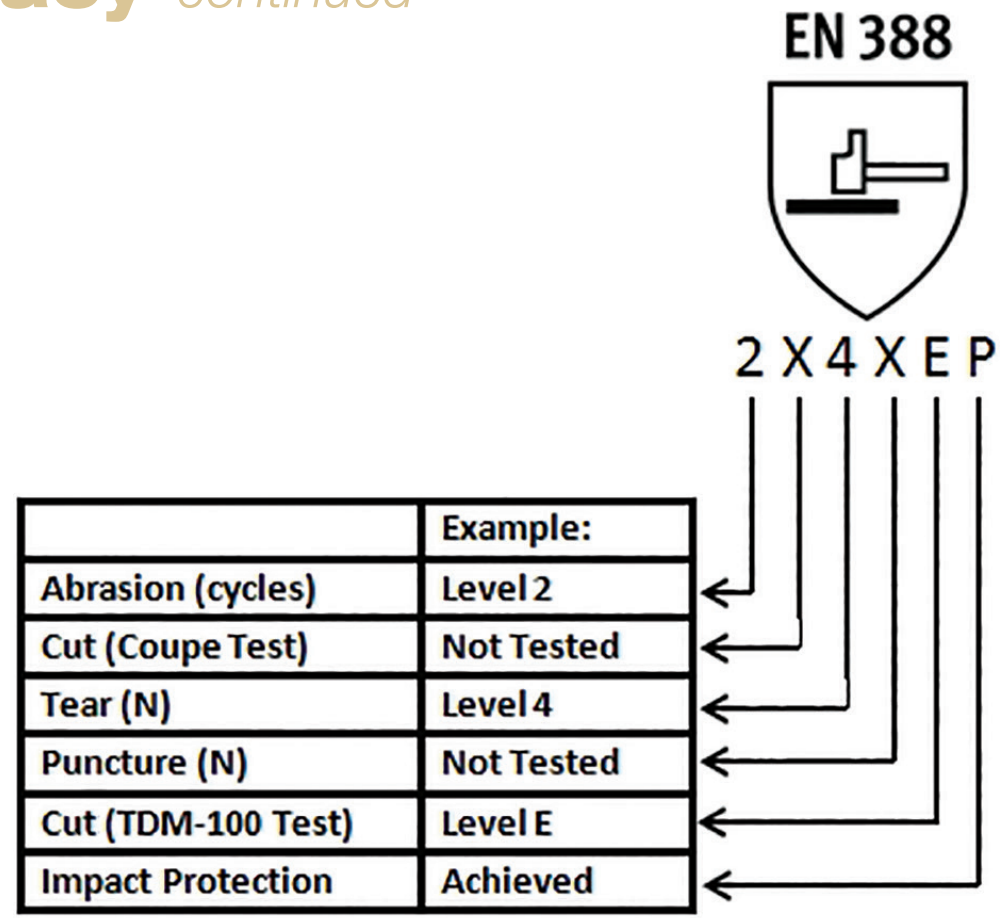

Figure 2: New labeling for specific results

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1 http://www.ishn.com/articles/94029-drive-home-the-value-of-gloves--hand-injuries-send-a-million-workers-to-ers-each-year

2 Ibid

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