Industrial Safety & Hygiene News
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helping HAND

February 2010

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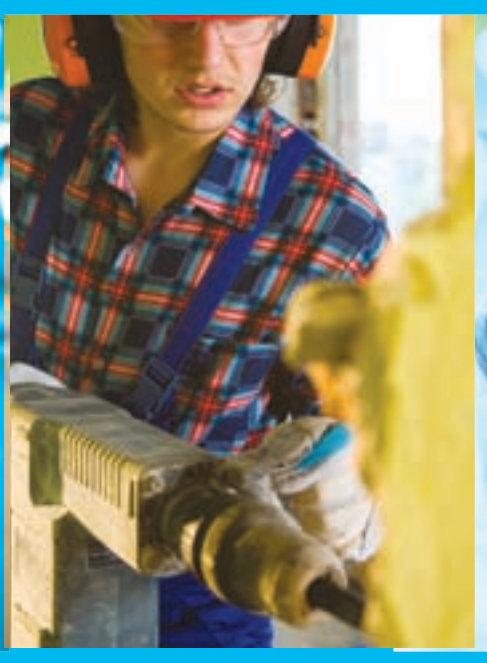

More than merely **gloves**

Hand protection calls for a comprehensive approach

By JOHN MEULENBROEKS, CIH, MHSC., BSC.

In a perfect world, it would be possible to avoid hand injuries simply by purchasing gloves and asking employees to wear them. But nothing is that easy. Effective hand protection requires a more systematic and comprehensive approach.

Understand the risks

A look at the following categories of hazards makes it easy to understand why gloves alone do not provide adequate protection:

- Chemical hazards including toxic, corrosive, allergenic, irritating, sensitizing and carcinogenic effects.
- Biological hazards including infectious and allergenic responses.
- Physical contact hazards including pinches, crushing, abrasions, cuts, radiation, heat/cold, electricity and other forms of energy, etc.
- Strain hazards including repetition, forceful exertions, pressure contact etc.

The first phase: Develop your P&P

If you have frequent injuries related to lack of hand protection, you need to immediately assess the situation and remove any barriers to the use of hand protection. A comprehensive and systematic approach begins with a written personal protective equipment (PPE) policy & procedure (P&P) approved by senior management.

Here are some key elements of an effective P&P:

1—Policy statement. This defines the overall purpose of your P&P including legislative compliance and employee protection. It also identifies those to whom the policy applies including employees and contractors and explains what will be done and by whom to ensure hand protection.

Even though the risks of injury are numerous, you won't find a legal standard that deals specifically with hand safety.

2—Specific actions required by each level of the organization. These are the steps required to achieve the policy objectives.

3—Organization-wide risk assessment and determination of PPE requirements. This step deals with the identification and evaluation of hand risks present in each job.

4—Guidelines for PPE selection and use requirements (or control of hazards).

5—Means of review, ongoing support, auditing and evaluation of the P&P at least annually.

Other elements of the P&P can include references, record keeping, health evaluation, storage, definitions and training guidance.

The next phase: Risk assessment

The following steps will enable you to conduct the risk assessment according to your policy:

1—Acquire complete, accurate descriptions of every task for each job in your organization.

2—With the aid of a person who regularly performs the job, identify all potential hand hazards.

3—Prioritize by rating the seriousness and probability of each hazard.

4—Identify the necessary gloves as well as actions to be taken, such as selecting safer tools, improving work methods etc., in order of priority.

Consider the "personal" part of PPE:

Gloves must offer dexterity, flexibility, comfort, fit and tactile sensitivity. Hands come in all sizes, so be sure sizes range from extra small to extra large.

Always conduct trials with new gloves and get input from a cross section of users before purchase decisions are made. Formulation of a PPE team for large scale analysis and decisions can work well.

Because of potential allergic reactions, use non-powdered, non-latex gloves whenever possible. Powder was originally put in gloves to aid with donning and is not needed anymore with new materials

Consider the "protective" part of PPE:

Look for specifics regarding chemical and biological breakthrough when selecting glove material — viral penetration should meet ASTM standards. Build in a safety factor when applying the breakthrough time to a change out schedule. For example, recent research indicates that breakthrough times should be reduced to account for hand movement during use. Hand movement is not part of the material chemicals breakthrough measurement process.

Consider the quality of the glove, not just the cost. Thickness does not tell the whole story. Tensile strength is the maximum pressure a glove material can take without tearing. Elongation is the percentage of stretch without tearing. Both are indicators of durability and the ability of a glove to stand up to stressful hand movements or contacts.

Always inspect gloves before use (test rubber or synthetic gloves by inflating them). Ensure that fingernails are well trimmed and no rings are worn under gloves. And whenever possible, keep gloves at the point of use to ensure they are readily available.

Other considerations

Having too many different gloves can lead to confusion and unnecessary expense. Our organization actually saved significant money by standardizing to two types of exam gloves offering better quality.

Be aware that gloves may actually introduce hazards. Know when not to wear gloves, such as around the danger zone of high speed machinery. Glove substitutes such as barrier creams may work in some cases.

Beyond providing basic protection, gloves must offer the dexterity, flexibility, comfort, fit and tactile sensitivity needed for the task.

Many hand injuries occur because of unexpected hand contacts which may have been overlooked during hazard assessments. Make sure employees know to keep their hands out of the line of fire of moving objects and within a clear path of travel when they are moving around the facility.

Finally, don't assume. Perform hands-on audits that include an assessment of whether or not the personal and protective elements mentioned above are in place. Train employees in glove use, especially when new products are brought in. Preach hand protection in the home as well as at work because home injuries affect work performance. Address potential reasons for not wanting to wear gloves, and always include managers and supervisors in every step of the process. ISHN

John Meulenbroeks, CIH, MHSc. (in occupational & environmental health), BSc. (in toxicology). John is presently senior EHS coordinator with Lakeridge Health Corporation, where he has been employed since 2004. Contact him at jmeulenbroeks@lakeridge-health.on.ca.

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Where are your **gloves**?

Most hand injuries happen to workers not wearing protection

By LORI A. SHAFFER

In a study conducted by the Bureau of Labor Statistics, 70 percent of workers who experienced hand injuries were not wearing gloves. The remaining 30 percent of injured workers did wear gloves, but experienced injuries because the gloves were inadequate, damaged or wrong for the type of hazard present.*

OSHA states that employers must use PPE to provide additional protection against hazards that cannot be completely eliminated through other means. The hand injuries that employers need to guard against in the workplace, according to OSHA, are:

- Burns
- Bruises
- Abrasions
- Cuts
- Punctures
- Fractures
- Amputations
- Chemical Exposures

One resource for glove selection is The International Safety Equipment Association's glove standard ANSI/ISEA 105-2005, American National Standard for Hand Protection Selection Criteria. It provides a consistent, numeric-scale method for manufacturers to rate their products against certain contaminants and exposures including puncture and abrasion resistance, chemical permeation and degradation, detection of holes, and heat and flame resistance. The 2005 edition also includes tests and selection criteria for vibration reduction and dexterity.

What about compliance?

After selecting the right gloves for a task, how does an employer make sure workers will wear them? Training is key. It is essential to provide employees with information on what hand protection to wear for different tasks, how to don, doff and care for gloves, as well as when to replace gloves. Workers should be taught to visually inspect gloves before each use and to discard and replace any gloves with impaired protective ability due to pinholes or material degradation.

Fortunately, because glove materials today have become so advanced, the development of new glove technologies tends to focus not just on function, but also on issues of fit, comfort and style. Proper fit is critical because it leads to improved productivity. When discussing fit issues, keep in mind that this includes finger length (gloves should not be too long to avoid getting caught in moving equipment) and overall sizing (hand circumference should not be too small so that it reduces the user's range of motion or too big so that the gloves are too loose). If a glove is more comfortable to wear, users are more likely to comply with PPE protocols — a win/win for both workers and employers.

Features to consider

For general purpose applications, breathable hand protection provides comfort for extended wear. Look for features such as ventilated backs, breathable nylon backing and seamless knit liners. Cotton or poly-cotton liners provide good perspiration absorption and improved hand comfort when non-barrier gloves must be worn.

When cut protection is required, look for comfortable, seamless gloves made of materials that provide protection without compromising comfort. For chemical and liquid resistance, choose gloves made of rubber (natural/latex, butyl and nitrile) or rubber-like materials such as neoprene, or various kinds of plastic (polyvinyl chloride (PVC), polyvinyl alcohol and polyethylene) to protect workers from burns, irritation and dermatitis caused by contact with oils, greases, solvents and other chemicals.

In addition, it's critical to select high-dexterity hand protection, particularly for applications that require the use of fine motor skills. Some glove features that increase dexterity and grip are:

- Coated fingertips
- Textured fingertips
- Dotted palms

For dexterity and abrasion resistance, also consider nitrile gloves, which are ideal for tasks such as small parts handling, warehousing, shipping and receiving. Polyurethane coated gloves also offer excellent grip and tactile sensitivity, making them ideal for tasks such as electronics handling and precision assembly.

Finally, style is becoming increasingly important among workers, and stylish PPE can tip the scale toward improved compliance. Gloves and eyewear tend to be ahead of most other PPE in terms of style. Leading glove manufacturers are taking cues from the retail clothing and performance athletic clothing markets to develop trendy, yet functional styles that people want to wear, especially with the emergence of the Generation Y workforce. Some companies are also beginning to distinguish their products with non-conventional signature colors such as purple for nitrile gloves.

It pays to protect

In addition to the physical harm that hand injuries pose to workers, they also have financial implications. The average hand injury claim has now exceeded $6,000, with each lost-time workers' compensation claim reaching nearly $7,500, according to the Bureau of Labor Statistics and the National Safety Council. When you consider these statistics, the overall drain on employee productivity is apparent. While glove use is not the only way to protect against hand injuries, it is a crucial component of any injury prevention program. Finding ways to help workers comply with glove-wearing protocols will go a long way toward creating a safer and more productive work environment. ISHN

Lori is a category manager with Kimberly-Clark Professional. For more information on personal protective equipment and other useful PPE-related tools, visit www.kc-safety.com.

* Source: U.S. Bureau of Labor Statistics, www.bls.gov

tious material (OPIM), mucous membranes, or non-intact skin and when handling or touching contaminated surfaces or items. Please bear in mind that the term "contaminated" is defined as the presence or the reasonably anticipated presence of blood or other potentially infectious materials, rather than just "visibly" contaminated.

OSHA requires that disposable gloves be changed as soon as practical when contaminated and as soon as feasible when they are torn or punctured. These requirements protect the employee from exposure to the hazards of bloodborne pathogens. OSHA does not require that gloves be changed between patients if they are not contaminated and their barrier properties have not been compromised. However, as stated in the preamble to the standard, changing gloves between patient contacts is good infection control practice to eliminate patient-to-patient transmission of disease. Additionally, if the conditions you described in your letter are anticipated to occur, such as the chance of patients' tubes and catheters splashing employees during transport, then certainly, gloves must be used, to protect the employee from exposure to blood or OPIM. Further, employees who have contact with contaminated linen and trash must wear protective gloves which must be changed when contaminated.

In addition, please be aware that, should the situation arise where you or your fellow co-workers have to change your gloves and are denied and/or your supervisor retaliates, you may wish to contact the local OSHA Area Office. OSHA, in addition to investigating safety and health complaints, has authority under Section 11(c) of the Occupational Safety and Health Act to investigate and take appropriate action on an employee reprisal, if it resulted from filing a safety or health complaint with OSHA or a complaint to an employer.

Letter of interpretation, April, 2007

Gloves used to meet PPE requirements of bloodborne pathogens standard

OSHA says: This is in response to your letter in which you requested clarification concerning the use of gloves in administering routine injections under the Occupational Safety and Health Administration (OSHA) regulation, 29 CFR 1910.1030, "Occupational Exposure to Bloodborne Pathogens."

The personal protective equipment requirements of the standard are performance oriented. That is, it is the employer's responsibility to evaluate the task and the type of exposure expected and, based on the determination, select the "appropriate" personal protective equipment in accordance with paragraph (d)(3)(i) of the standard.

At a minimum, gloves must be used where there is reasonable anticipation of employee hand contact with blood, other potentially infectious material, mucous membranes, or non-intact skin; when performing vascular access procedures; or when handling or touching contaminated surfaces or items.

In general, OSHA agrees with you that gloves are not necessary when giving routine injections as long as hand contact with blood or other potentially infectious material is not anticipated. If bleeding is anticipated and the employee is required to clean the site following injection, then gloves must be worn. Additionally, if the patient's skin is abraded, gloves would be required.

Letter of interpretation, September, 1992 (most recent policy position)

Cradle-to-cradle use of insulating rubber gloves and sleeves

OSHA says: Protocols related to effective use of insulating rubber gloves and sleeves:

1. When employees are working on energized circuits or equipment using the rubber glove method, rubber protective-insulating gloves and sleeves rated for the exposure of the highest nominal voltage shall be worn cradle-to-cradle when working from an aerial platform.

Rubber protective insulating sleeves are not required when employees are working circuits with a potential of 600 volts or less if there is no upper arm exposure and the worker will not encroach the 5-foot primary zone.

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Real-world uses of **gloves**

OSHA answers questions from the field

By DAVE JOHNSON, Editor

Selection of hand protection for cold environments

OSHA says: You were concerned that there are no objective standards for cold weather gear, from any of the consensus standard organizations, on which to base your PPE hazard assessment. The PPE standard for hand protection, 29 CFR 1910.138, specifies the selection criteria to be used when providing hand protection.

However, unlike the other revised PPE standards for eye and face, head and foot protection, the hand protection regulation does not specify criteria for the actual equipment to be provided to employees. The standard states, "Employers shall base the selection of the appropriate hand protection on an evaluation of the performance characteristics of the hand protection relative to the tasks to be performed, conditions present, duration of use, and the hazards and potential hazards identified."

As stated in paragraph 2 of Appendix B, Assessment and selection, "It should be the responsibility of the safety officer to exercise common sense and appropriate expertise to accomplish these tasks."

Employers should use manufacturers' data on the effectiveness of any given product to protect against cold, as well as employee feedback, in selecting hand protection.

Letter of interpretation, March, 1995 (most recent policy position)

Changing disposable gloves between patient contacts

OSHA says: In your letter, you requested clarification of the CDC's requirements for the use of clean gloves during patient transport. Your paraphrased scenario is presented below, followed by our response. Please be aware that this response may not be applicable to any scenario or question not delineated within your original correspondence.

Scenario: On December 6, 2006, your hospital's operating room (OR) staff was informed by the Infection Control personnel that it was no longer acceptable for the OR employees to wear clean exam gloves while transporting patients, nor was it acceptable to wear clean exam gloves when transporting trash and linen to the decontamination area. The rationale offered for this policy was that if the patients were provided and are using clean gowns and linen, there was no need for gloves. Also, if the trash and linen bags were not soiled, then there was no need for gloves either. However, it is your belief that you and your fellow co-workers should protect yourselves by using clean gloves during all transport. Further, you were advised by your supervisor that you will be counseled on your behavior should you continue to wear clean exam gloves while performing the above mentioned duties.

Response: The personal protective equipment requirements of OSHA's Bloodborne Pathogen standard at 29 CFR 1910.1030(d)(3), are performance-oriented. As such, it is the employer's responsibility to evaluate the tasks and the types of exposure expected at his or her workplace and, based on the determination, select the "appropriate" personal protective equipment in accordance with paragraph 1910.1030(d)(3)(i) of the standard.

At a minimum, gloves must be used where there is reasonable anticipation of employee hand contact with blood, other potentially infec-

Pick the **right glove**

Today's materials give workers a choice

By DAVE SHUTT

With today's myriad of industrial hand protection requirements, the glove industry is continually improving the materials used to manufacture gloves. Today's glove fibers and fabrics make it possible to produce gloves that resist cuts, provide a microbial barrier, absorb oil, ensure grip, protect against heat, insulate against cold, protect sensitive equipment or resist chemicals. Some glove fabrics even accomplish more than one of these tasks.

In general, industrial gloves can be categorized as disposable, chemical resistant, cut resistant, general purpose, high tech or specialty, which covers the thermal varieties and gloves that meet unique workplace requirements. Within each of these categories, there are gloves made of materials to meet the exacting specifications of different industries.

Disposable glove materials

Nitrile, natural rubber latex (NRL) and vinyl are the most widely used materials for disposable gloves. Each material has features that make it ideal for specific applications. Vinyl, for example, is the least costly material and often chosen for industrial use when the worker changes gloves frequently in the course of a shift due to such factors as a need to avoid cross-contamination of materials. A new development is a unique "stretch" formulation with form-fitting comfort previously unavailable in disposable vinyl.

One of the more popular glove materials, nitrile replicates many of the positive characteristics of NRL without the latex allergy threat that NRL poses to some workers. Since its introduction 15 years ago, nitrile has become a latex-free favorite for disposable gloves. Most recently it has been introduced in an "accelerator-free" form, free from both the type I allergic reactions linked to latex proteins and from the accelerators common in all disposable nitrile gloves, which have been linked to workplace conditions like type IV dermatitis.

Nitrile is widely used across all industries that require high performance from a single-use glove. It is often used for gloves that must protect both the worker and the materials being handled such as high-end semiconductors, as well as for lab and food processing environments where exacting standards of industrial hygiene are required. Innovation in nitrile technology has led to development of both smooth and textured (fingertips) nitrile gloves. Nitrile is also fabricated in high-visibility colors and a variety of other colors, including black.

Natural rubber latex is the grandfather material for disposable gloves. Relatively inexpensive, it has outstanding strength, wear and dexterity and makes for a glove that is cooler, more durable, better fitting, more sensitive and less susceptible to tearing or developing holes than similar-gauge vinyl gloves. Processors have been working to develop a low-protein NRL that would virtually eliminate the latex-allergy possibility in NRL gloves.

Cut-resistant fabrics

The industrial glove industry has developed a number of fabrics to address the threat of cuts in the workplace and that have proven to be very effective in terms of cut resistance. One such fabric, for example, which was developed out of the need for a bullet-proof material, is many times stronger than the same weight of steel. Other fabrics are made of composite yarns with a non-wire core. Many cut-resistant glove fabrics are a combination of one of these engineered fibers with another fiber designed for stretch, insulation or comfort.

Chemical-resistant fabrics

Depending upon the application, there are literally hundreds of different required charac-

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Cut-resistant gloves:

Is your **PPE** as tough as you think?

Different test methods deliver different results

By STEVE VANERMEN

Cut-resistance is a function of a glove's material composition and thickness. Glove manufacturers typically use the ASTM F-1790-4 standard to obtain cut-resistance ratings ranging from Level 0 to Level 5. This test involves the interpretation of data obtained from putting varying pressure (weights) on a standardized razor-type blade and recording the distance the blade travels (at a constant speed) before cutting through.

Keep this in mind: not all Level 5 gloves afford the same protection. Why? In the European market, gloves are evaluated according to EN388, the mandatory performance standard for all gloves as standardized and regulated by the CEN. This cut test method, called the Coup test, uses a constant weight on a counter-rotating circular blade that is moved back and forth across a sample by the test machine. Ironically, this test, designed to measure cut resistance, is not suitable for materials that have a high degree of cut resistance as the materials that contribute to cut resistance (glass fibers, steel or hard guard plates) tend to dull the blade and overestimate the real world protection provided by such gloves.

Photo courtesy of HexArmor

The ASTM method F1790-04 is similar to the ISO 13997 test. The ISO 13997 or the ASTM F1790-04 tests are the recommended method by the EN388 standard to calibrate the cut-resistance of high-cut resistant materials. In fact, it is noted in the EN388 documentation that the standard EN388 test is not applicable to gloves made from very hard materials.

It is further noted that the alternative test method for high cut-resistant materials is described in ISO 13997.

Wide range of performance

If test results of various products identified as CE Level 5 products are taken and normalized on the ISO or ASTM test, we find that CE Level 5 gloves offer a wide array of performance ranges.

Some of these gloves score as low as 1000 grams (10 Newtons), qualifying them barely for a Level 3 on the ASTM/ISEA scale. Note that the force required to cut through is expressed as grams in the ASTM test and in Newtons in the ISO test. These numbers can be converted for comparing the results on these tests. (100 grams = .98 Newtons).

When normalized, we see that the scores of gloves claiming to be CE Level 5 gloves vary quite a bit.

Why is this?

There are several reasons for the variability: testing consistency, operator variability, material variability, etc. However, the single largest factor is this: While the EN388 standard suggests that the Coup test is not appropriate for materials that abrade the cutting wheel, the standard doesn't require the alternative ISO be used. Section 6.2 of the standard merely states that the test is not appropriate for hard materials like chain mail, but doesn't contemplate other hard materials.

So, some manufacturers, while knowing the test is not appropriate, use it anyway to get the higher score. This is common in gloves that are blended with fiberglass, as the fiberglass "fools" the Coup test by dulling the blade The range of performance that gloves can score and still qualify for a Level 5 is so varied, that the CEN body (European Committee for Standardization, the major provider of European Standards and technical specifications) is going to require gloves to not only list their Cut Level, but to note their average Newton force.

Why would they do this?

Because they recognize that worker safety requires a better understanding of the real cut protection a glove is providing.

In our field studies of injuries and the corresponding hand protection worn, we see that many injuries can happen with PPE rated in the range below ASTM/ISEA Level 5 of 3500 grams (35 Newtons). This can be demonstrated easily with a razor blade (simulating sharp metal or glass) and how easily typical CE 5 gloves, for example, will cut.

Photo courtesy of HexArmor

As a result, many of our customers have adopted standards in their own organization, specifying a minimum cut at a certain number such as 3000 or 3500 grams- Level 4 or 5 ASTM. Keep in mind the standard is just a guide, the profile of the hazard and actual use conditions are paramount. We always encourage conducting a safe test in actual situations: new gloves, used gloves, saturation with oils and fluids, etc.

Many cuts begin with a puncture

Cut resistance tests are just one element of what needs to be considered. Often punctures are misreported as cuts. A sharp edge, corner, burr, or other protruding hazards can penetrate the glove and scrape or cut skin. With knit gloves the hazard can actually poke through the open knit and cut the skin without cutting the glove. How does this happen? Depending on the density of the knit and gauge of the glove (the measure of the number of knitting needles per inch), and the thickness of the fibers a glove may "window" and allow the knit to spread

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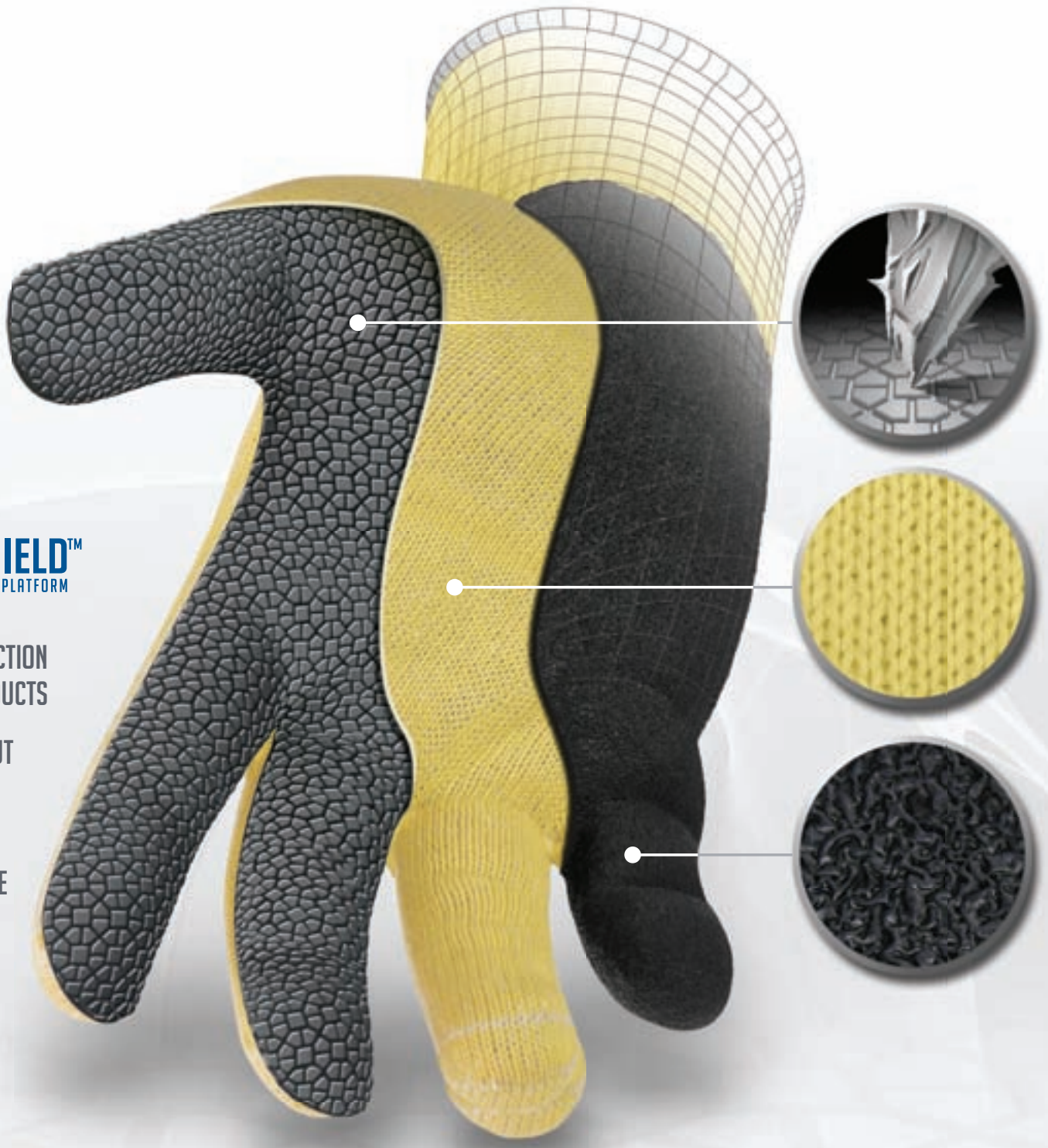

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Is your PPE as tough as you think?

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apart, thus allowing a sharp point or blade to cut the hand. Plating with small guard plates, such as in HexArmor® products made with SuperFabric® brand material, reduces this effect as the plates shield the knit structure from the hazards. The plates also lock in the knit and don't allow the knit to window as in traditional gloves.

Other factors

Abrasion resistance is also a critical factor in preventing hand injuries. In fact if a glove fails too early due to wearing through from an abrasive hazard, the skin is quickly exposed to cut hazards. So the higher the abrasion level the higher the level of protection from not just abrasion, but from cut and punctures.

Stability. Evaluate performance of a new glove versus a glove that has been worn for a day. Look for products that don't degrade when exposed or used. Some products are affected when subject to abrasion, washed or exposed to UV light. Many products on the market lack the ability to provide consistent performance.

Wind-up. Some materials can be caught in machine parts such as rotating grinding wheels or drills and sanding materials. This can pull the hand or finger into the equipment and cause severe injury to tendons, muscles, and ligaments. Protective gloves that prevent or reduce wind-up risks are available and can be used where risks are present.

Photo courtesy of HexArmor

Fit plays a part in the level of protection. Gloves that are too tight may cut easier as many of the fibers used for cut resistance use a rolling action to increase cut resistance. When these fibers cannot roll, such as when they are stretched from an ill-fitting or wrong sized glove, they can "lose" some of their cut resistance. Take an example from the kitchen and do this simple experiment: Put a cucumber on a cutting board and take a very sharp knife. Try to cut the cucumber with a sawing motion without holding the cucumber. It just rolls and doesn't cut. Now hold that cucumber and do the same thing. It cuts very easily. So, tight fitting gloves can perform like the immobilized cucumber. Loose fitting gloves can also be a hazard for catching or snagging on tools and equipment. Make sure your glove program accounts for proper sizing and employees know what to look for when picking gloves.

Coating impacts cut resistant gloves that use cut resistant fibers. Once the coating is applied, the rolling and twisting that helps the fiber achieve its cut resistance can be reduced. Most coated gloves have a higher cut resistance on the back of the hand than on the palm because the fibers are not coated. Keep this in mind as you select your hand protection.

Grip is also important. Using grip that isn't appropriate for the job can lead to higher injury rates as objects with sharp edges slip, causing slicing motion on the gloves.

What to do when evaluating gloves

With all of this confusion (what tests are relevant today, what performance factors to consider) in the PPE market, what can be done to make sure that as safety professionals, we pick the best gloves for the job? In our opinion based on real world tests, the Coup test is not a relevant test for today's materials. An oscillating blade with a mere 500 grams of force (1.1lbs) is not relevant to, for example, an automotive worker moving sheet metal fenders and body panels. Look around your office. That steel stapler on your test is probably about two pounds. The ISO and ASTM tests offer a better approximation of what you are going to find in a real-world work situation. That combined with an assessment of "other factors" mentioned above is what you need for picking the correct PPE. To summarize, we have the following recommendations:

Partner with respectable distributors and glove manufactures to analyze your operations, specific hazards, injury rates, and cost of current products used.

Get the data. Ask for the outside lab results and focus on the Newton/Gram Results, not just cut levels. If you are not getting the Newton number, then the glove was tested with the Coup test, and something must be wrong.

Assess the risk. Is it purely cut? Or is there a puncture risk too? If so, how can it best be protected?

Test, test, test. Conducting safe and scientific tests with typical hazards is something your glove manufacturers should be able to help with. A hunting knife in the conference room does not qualify. Get out in the plant and setup a safe test for a true work hazard in the real world.

Keep good records. If you don't already, begin collecting injury data with pictures. Classify cuts. Track successes over time and evaluate new products as they become available. ISHN

Steve VanErmen is founder, president, and CEO of HexArmor. Steve was previously a co-founder of a well-known consulting firm where his responsibilities were to help organizations achieve world class performance in sales, operations, and technology.

Call 1-877-MY ARMOR or visit hexarmor.com. HexArmor products are cut and puncture resistant, not cut and puncture proof. Do not use with moving or serrated blades or tools. User shall be exclusively responsible to assess the suitability of the product as specified for any individual application or use. Protection zones are to be used as a general guide. Actual product protection zones may differ. US Patents: 5853863, 5906873, 6159590, and foreign patents. Additional patents are pending

In **extreme** environments

Protecting the back of your hand

By ANDY OLSON

Is there any doubt? Hands are crucial for our lives and work.

But because of their vital role in our working lives, hands are also vulnerable to injury. In fact, the Bureau of Labor Statistics estimates that hand and finger injuries cause about 110,000 workers to lose days from work each year, a rate second only to back strain and sprain.

Thus it's not surprising that protecting hands from injury is a fundamental part of most workplace safety programs.

Too often, though, these efforts focus primarily on the palm side of the hand. Less attention is paid to protecting the back (or dorsal) side, which is critical for our hands to operate effectively.

This becomes even more important in extreme environments where dorsal side injuries are more common. Think oil and gas drilling, extraction, and refining; mining; heavy construction; demolition; cargo handling; and other industrial settings.

Let's take a look at our hands

We say that we are familiar with something when we "know it like the back of our hand." However, hands are complex. There is a lot to know.

Start with the bones. Each hand is comprised of 27: 14 in the fingers, eight in each wrist, and five in the metacarpus or palm. Movement of these bones is controlled by forearm muscles which are connected to the bones via tendons.

In some ways, it's helpful to think of our hands as marionettes. Muscles pull strings (tendons) on the bottom side of our forearms which cause our fingers to grip (a movement known as flexion). Muscles on the back side of our forearms cause fingers to open (a movement called extension). Both are critical for work; you do need to let go of things after all.

The smaller hand muscles allow for delicate movements and work with the nerves and blood vessels to allow feeling and for using our hands effectively.

Protecting our hands

Injuries to these bones, tendons or muscles are often caused by an impact, a pinch, or a blow. And these injuries can be significant. Damage to just one hand component can make a worker less effective or even prevent them from performing their duties completely.

Natural protection for the palmar side of the hand is provided by thicker skin and numerous cell layers. These layers can be enhanced with calluses, essentially thickened pads of dead skin cells built up from work. Still more padding is provided by muscles and fat cells.

The vast majority of hand protection solutions (i.e. gloves) focus on the palm side of the hand. Gloves designed to protect against cuts, abrasion, burns, impact, or vibration do so with special padding, thick leather, or other heavy materials.

Most often, these gloves address the dorsal side with a thinner material offering minimal protection. This "other side of the hand," with its thinner skin and fewer muscles is less naturallly protected from injuries. And that makes wearing gloves that focus only on the palm side of the hand like wearing sandals—fine for a walk on the beach, but not appropriate for work environments where both sides are at risk.

Protective approaches

Engineering controls are always the preferred method of hand injury prevention. Designing work environments, equipment, and tasks so that workers' hands are never placed in jeopardy is the best approach. However, this is not always realistic, especially when workers are engaged in construction, assembly, disassembly or repair-type tasks that require hand tools or extreme handling.

Training, work practices, and administrative controls are also effective in keeping workers' hands out of danger zones. They can prevent impact, pinch, or blow injuries when working around moving parts, equipment, or large loads. Examples include tag lines, tools, and reach poles. However, the success of this type of 'hands-off' policy requires that it be effectively promoted and enforced.

Some tool manufacturers have designed their hand and power tools to protect the dorsal side of the hand in a way similar to sword hilts. This can be seen in the brush guard on most modern chainsaws. Unfortunately these types of guards are sometimes "clunky" and limited in their effectiveness.

Thickly padded gloves also raise concerns in work applications. Where hand clearances are already limited, bulky gloves can interfere with access to parts or fasteners, making fine work more difficult. Bulky gloves also increase the chance of getting caught in moving parts when working around moving equipment or machinery. Of course, in warm climates and hot environments thickly padded gloves can be uncomfortable. All of the above may lead to workers choosing not to wear the glove, leaving their hands exposed and more vulnerable to injury.

The challenge of knuckle-buster jobs

So how do you protect both sides of the hand while still allowing workers to do their job?

In addition to engineering controls, training, and work practices, there are certain specialized gloves that have been designed to address this issue. These gloves balance protection, dexterity, and fit in order to be effective. As with most other PPE selection, choices must evaluate the specific hazards and task demands faced.

If impact and injuries caused by blows are a concern, then dense padding may be appropriate to distribute the force across a greater portion of the hand and to protect the bony back side and knuckles. In addition, strategically placed molded rubber, both on knuckles and fingers, may further serve mitigate the affects of an impact, a pinch, or a blow.

Abrasion protection must surround the entire hand to be effective. If the goal is to prevent incidental contact between the dorsal side and a rough or sharp surface, narrow hold-off strips can be effective at distancing the hand from the surface while allowing easy finger movement. Rugged technical materials such as Armortex® and Kevlar® should also be considered for abrasion protection.

While impact and abrasion protection are important, they should not come at the expense of worker motion. Using padding or other materials that are too thick or too bulky will compromise dexterity and make the glove more a hindrance than a help.

Finally, the protective glove must fit comfortably and correctly. A comfortable and secure fit ensures the glove will be worn and therefore able to provide the intended protection.

Summary

Hands, movement, gripping, and dexterity are critical to our life—on the job and off. If the back of the hand gets injured, the entire hand may be rendered useless, perhaps for an extended period.

Follow the hierarchy of controls to eliminate or reduce risk as much as reasonably possible. Where you can't use engineering or administrative controls, use effective hand protection PPE like ProFlex® Gloves. Proper selection of hand protection PPE requires looking at the worker, the task, and both sides of the hands.

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Andy Olson is product manager for Ergodyne, Minneapolis, MN; (800) 225-8238; (651) 642-9889; www.ergodyne.com

spotlights

Cutting edge/cut resistance®

Banom specializes in cut-resistant gloves for the sheet metal, glass, paper and food industries. With 60 years experience in cut-resistant gloves, we consistently reduce hand and arm lacerations as well as total dollars spent. For more information, call **Banom** at 800-227-7694 or visit banom.com. ***Circle 320***

Comfort glove

So comfortable you won't want to take it off, Showa Best Glove's Showa Opti Grip™ 340 glove invites continuous wear with across-the-back ventilation, Lycra in the fingers of the stretch nylon liner, and elasticized wrists. Its lightweight latex coating is etched for vice-like anti-slip wet and dry grip and top performance on the job site. **Showa Best Glove**, www.showabestglove.com, (706) 862-2302. ***Circle 321***

Black exam gloves

Cordova Safety's new Nitri-Cor Eclipse™ Black Exam Gloves feature a low-modulus Nitrile formulation that provides excellent comfort and tactile sensitivity while protecting against snags and chemical splashes. Nitri-Cor Eclipse™ gloves are powder free, fully textured and certified as Class I Medical Devices. While perfectly safe for medical use and food contact, the black color hides dirt and grime, making them ideal for industrial applications as well. **Cordova Safety Products**, (800)-458-8763, www.cordovaisc.com. ***Circle 322***

Glove accessory

Glove Guard is proud to announce new light blue, metal detectable versions of their Glove Guard® and Utility Guard™ lines for use in the food industry. Glove Guard products have proven to reduce hand injuries and glove replacement costs resulting in a great Return On Investment. Contact **Glove Guard** at www.gloveguard.com. ***Circle 323***

High-performance PPE

Want a crazy amount of cut and puncture protection? Try HexArmor® 9000 Series. In the last 24 months, we've launched ground-breaking technologies and dozens of new products with one goal in mind — to challenge industry standards for mechanical protection and create a new generation of high-performance PPE. **Hexarmor**, www.hexarmor.com/9000series. ***Circle 324***

Hi-viz anti-vibration glove

Mechanic's glove style designed for maximum comfort and dexterity. Used with vibrating power tools at night or in low-light conditions. Patented Air technology protects the palm, thumb and fingers. Synthetic suede with grip patches. Reflective strips on the back and fingertips enhance visibility. Glow-in-the-dark cuff and bright mesh back. Meets ANSI S2.73-2002 (R 2007) / ISO 10819:1996. **Impacto Protective Products, Inc.**, 888-232-0031. www.impacto.ca. ***Circle 325***

Mining glove

MCR Safety's 940 Xcavator is a men's gunn pattern mining glove with a beige grain/split pigskin double leather palm. Black canvas back and 2-in. ribbed elastic knit wrist with beige grain pig durable hang loop on back of hand at the wrist. Features include a full sock fleece lining and foam padding on the back of hand, fingers, and wing thumb. Available in sizes small through XXL. Call **MCR Safety** at 800-955-6887 or visit www.mcr-safety.com. ***Circle 326***

High-visibility glove

For the industrial workplace, our Safety FastFit Glove gives you enhanced contours for a more comfortable fit. Reflective strip panel and high-visibility Day-Glow two-way stretch Spandex adds visibility. The glove also features a Clarino Synthetic Leather palm, Lycra panels between the fingers, two-ply fingertips and thumb to reduce wear and increase protection. A new taller cuff was incorporated for a more secure fit. **Mechanix Wear**, www.mechanix.com/safety, (800) 222-4296. ***Circle 327***

TIG glove

Revco's 25D-BLK TIG glove offers maximum dexterity and a superior fit and feel, with today's refined supple premium split deerskin that hardly sheds or flakes like traditional deersplit. It also features Revco's exclusive DragPatch™ side reinforcement for added protection, is stitched with flame-resistant Kevlar®, and has a long cuff to help shield against harmful UV lights. **Revco Industries**, www.revcoindustries.com. ***Circle 329***

Nitrile exam glove

SemperForce™ by Sempermed® black nitrile examination gloves are designed for demanding work environments where your safety and style are a must. Its black color will hide stains from grease, dirt, ink and dye. A textured surface promises secure gripping capabilities. This product is available in sizes small – XX-large. SemperForce™ black nitrile gloves are ideal for automotive, industrial, tattoo and cosmetology applications. **Sempermed USA**, www.sempermedusa.com. ***Circle 330***

Flame-retardant gloves

Southern Glove's Blowout Shield flame-retardant gloves provide the wearer a breathable comfortable fit, excellent abrasion resistance and certified flame-retardant protection. The Blowout Shield is constructed from heavyweight high-visibility fluorescent orange or green poly/cotton material and has a wing thumb providing no seams in the thumb wear area. The glove complements and completes the protection of flame-retardant clothing. **Southern Glove**, www.southernglove.com, (800) 222-1113. ***Circle 331***

Level 4 cut resistance

For the ultimate in cut resistance, dexterity and grip, the Tilsatec Flex 5 NBR (TTP060NBR) can handle it all. Made to meet a high ASTM Level 4 cut resistance, the shell is constructed from our proprietary Rhino yarn and dipped with high-quality NBR Foam. A winning combination of lightweight feel and dexterity, test levels that exceed 2700 Grams on CPPT score, and competitive pricing make this product a sure winner. **Wintex**, (800) 689-5154, www.wintex.ca. ***Circle 332***

Palm coated glove

Wells Lamont Industrial now offers Safety King® series palm coated glove in summer and winter version. These bright hi-vis green palm coated gloves are ideal for highway/road construction, ground traffic control and night shifts. Safety King creates greater visibility in light-diminishing weather conditions and/or environments. **Wells Lamont Industrial**, 800-247-3295, www.wellslamontindustrial.com. ***Circle 354***

Cut-resistant gloves

Safety managers recognize that high-visibility safety apparel is essential to worker protection. Sperian Protective Gloves introduces Tuff-Glo, an all-new product line of high-visibility, cut-resistant fiber gloves. Four styles are currently available to choose from with ANSI cut level ratings ranging from 2 to 4. For more information, call **Sperian Protective Gloves** at 800-430-5490. ***Circle 357***

Cut protection booklet

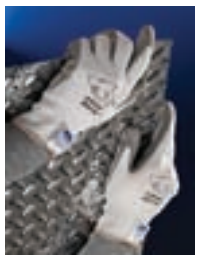
Superior Glove Works offers The Superior Book of Cut Protection, designed to eliminate the confusion of choosing cut-resistant gloves. This free booklet was created with input from industry experts, as well as Superior's own in-house expertise — the result of nearly a century in the glove trade. **Superior Glove Works Ltd.**, www.superiorglove.com, (800) 265-7617. ***Circle 358***

Nitrile glove

ATLAS® Nitrile 380 has a waffle-patterned foam nitrile coating for excellent grip in oily conditions, as well as dramatically increased abrasion resistance compared to standard foamed nitrile gloves. The air-infused coating breathes, as does the seamless nylon knit liner, to help keep hands comfortable. The famous ATLAS® Glove anatomical shaping and snug fit improve dexterity and reduce hand fatigue. **LFS Glove & Safety**, www.lfsgloveandsafety.com. ***Circle 359***

Biodegradable work glove

Gloves-online.com has introduced GO Greens™, a new line of environmentally friendly, coated work gloves made from bamboo fibers, a renewable and sustainable plant. Bamboo fiber is comparable to the texture and feel of silk, but with added benefits such as being highly absorbent, naturally abrasion resistant, naturally antibacterial, and 100% biodegradable, and offering UV protection with a UPF 50+ rating. **Gloves Online**, www.gloves-online.com, (877) 456-8313. ***Circle 356***



Cut-resistant gloves

Great White(tm) gloves from Protective Industrial Products are knit with Lycra(r) and Genuine DSM Dyneema(r), offering extreme comfort and dexterity. The specialized polyurethane palm coating provides a good grip in oily, wet or dry applications. These durable, cut-resistant gloves are cost-effective and designed to outlast leather, cotton and aramid fiber gloves. Sizes XS-XXL available. To find out more, visit **Protective Industrial Products** at www.pipusa.com. ***Circle 328***

Real-world uses of **gloves**

The term "effective cover up" is used to describe the installation of phase-to-phase rated insulating protective cover on energized conductors and/or equipment of different potentials when the lineman is within reaching distance or in areas extended by handling conductive objects.

The term "extended reach" is used to describe being within five feet of energized conductors and/or equipment or having a conductive object within five feet of energized conductors and/or equipment.

2. Electrical class rating of the insulating rubber sleeves shall meet or exceed the electrical class rating of the insulating rubber gloves when working on primary conductors.

3. Company policies shall apply when the above conditions cannot be met. Alternative work methods ensuring worker safety shall be identified, communicated to all affected workers, implemented and documented as part of the Job Briefing process.

Benefits:

Provides specific use requirements that are proven methods for reducing electrical contact injuries and fatalities.

Provides for uniform use guidelines that can be applied industry wide.

Minimum approach distances when using insulated gloves and sleeves

OSHA says: You have questions regarding OSHA's Electric power generation, transmission, and distribution standard, 29 CFR §1910.269 and the requirements for personal protective equipment when working with and around underground lines and pad-mount transformers. Your paraphrased inquiry and our response follow.

Question: What personal protective equipment (PPE) is required to be in compliance with the requirements for working within the minimum approach distances (MADs) of underground pad-mount transformers? Are both insulating gloves and insulating sleeves required?

Response: The requirements for working within the MADs of underground lines and transformers are the same as when working within the MADs of overhead lines. Paragraph 1910.269(l) addresses working on or near exposed energized parts; it is not limited to overhead lines. This paragraph does not differentiate based on nature of the component (line versus equipment), nor does it differentiate on the basis of the location of the energized part (overhead versus underground). Therefore, the requirements found in 1910.269(l) apply regardless of the location or nature of the exposed energized part(s), including those that require electrical protective equipment.

Regarding your question on the use of gloves and sleeves, 1910.269(l)(2)(i) allows for employees to work within the MADs of energized parts if they are wearing insulating gloves and insulating sleeves in accordance with 1910.269(l)(3). Paragraph 1910.269(l)(3) requires that, if employees are insulated from the energized parts through the use of insulating gloves, then insulating sleeves are also required with two exceptions. There are two conditions noted in 1910.269(l)(3)(i) and 1910.269(l)(3)(ii) that would allow an employee to use insulating gloves without the use of insulating sleeves: 1) if exposed energized parts on which work is not being performed are insulated from the employee; and 2) if such insulation is placed from a position not exposing the employee's upper arm to contact with other energized parts.

Letter of interpretation, September, 2006 ISHN

Advice from professionals

Hand protection dos and don'ts

Don't ask for opinions after the purchase

"From the manufacturer and distributor perspective, I would share that one of the biggest ways to increase the chances of success when changing a hand protection program is to involve multiple people from multiple layers of the organization.

"Hand protection/gloves is a very sensitive topic in a lot of companies for obvious reasons — people work with their hands. In many organizations they still use the styles of gloves that 'Uncle Tony wore when he worked here.'

"Many times purchasing tries to take over the decision on the products to use, leaving safety and the workers out of the mix. When we meet with companies to review their hand protection program and product selection, we encourage a cross-function group involvement. Purchasing certainly has a role, as does safety. But getting feedback from workers, senior people who actually wear the gloves is important. And getting them involved before a decision is final is key. Don't just ask for their opinion after the change has been made. Show them that their opinion matters by including them in meetings to discuss. It is important to let the line workers know that they do not have final say, but that their input will be valued and duly considered.

Loren Rivkin, Vice President, Marketing, Saf-T-Gard International, Inc.

Target high-incident departments

"Since 2005 we have conducted two-day kaizens focusing on departments with a historically high incident rate regarding hands and fingers. Job observation data is also filtered in. There is a cross-functional team including manufacturing engineering, affected department reps, and EHS personnel. Steady progress is being made on the difficult areas."

John Wesley CSP, OHST, EHS Manager, Alcoa Howmet, Hampton, Virginia

Short-term memory is the enemy

"In having worked in the manufacturing sector for many years and having conducted numerous training sessions, accident investigations and plant safety practice reviews, the most common cause of such injuries/illnesses (cuts, burns, musculoskeletal disorders, etc) was simply the human condition of ignorance — the unsafe act. This means in most cases that the injured person knew of the hazard(s) yet disregarded it (them) at their own peril. Heinrich's pyramid is representative of this activity. There are of course plenty of ways to communicate hand/finger/arm safety; however, as we all know, short-term memory is the enemy.

"Management must also assure that use of the job hazard analysis and the annual PPE hazard analysis are a part of the safety culture, and it must know that managers have effectively communicated this information. Machine guarding, lockout tag-out, HAZCOM and other OSHA standards are, as we all know, minimum requirements.

"I see no shortage in the availability of PPE where engineering controls cannot be applied. There are so many means of addressing hand and arm protection, and just based on given/known accident statistics, such importance should be obvious. What works is the constant discussion (reminders) along with dutiful and rigorous safety observations. There are many behavioral methods. Find one that is best suited to your needs and see the result.

"Lastly, use of small incentives for positive reward often gains buy-in. Work the problem — it can be solved."

Steve Damsker, loss control representative

Don't overplay the fear card

"Almost all interventions for finger-hand-wrist-arm safety predominantly focus on environmental controls. Some also include reminders (or pleas or pressure) to 'be aware' or, alternately, trying to shock/scare people into safety by showing gruesome pictures of the results of horrendous injuries. Fear can work — but we've found only to a low level of prevention (and results diminish over time). In real work life, every time I don't use the safest PPE, procedures, etc and I don't get hurt, I am reinforced that I can get away with these risks.

"We've found from working with companies in just about every industry worldwide that environmental/workstation/tool/PPE interventions are important — but only help to a point. Worker actions are critical to preventing hand injuries.

"'Awareness' campaigns are very limited. Many workers use their fingers and hands thousands of times/day. It's unlikely anyone could be aware of every one of their finger/hand movements. No question that attention control is one strong component to prevention. But skills at attention control (as well as a range of other physical skills) are critical for hand safety — well beyond telling people to 'know where you put your hands.'"

Robert Pater. Managing Director, Strategic Safety Associates/MoveSMART® ISHN

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Knit with MaxPly® Dyneema®, Terminator® gloves have incredible comfort and dexterity.

These cut resistant gloves have proven to be safe, durable and cost effective in sheet metal assembly operations. Special palm coating provides a good grip on oily, wet or dry surfaces.

Patented filament yarn construction of MaxPly® Dyneema® consistently outperforms other yarns for abrasive wear thus increasing glove longevity.

Continuous fibers won't trap dirt allowing gloves to remain cleaner longer and making laundering of gloves easier and more practical.

Gloves are latex free and contain no silicone.

Available in sizes 5 through 12 for an exact fit.

Style 8305. Also available in vend pack – style 8205.

For more information call us at **800 227 7694** or view our entire product line at **banom.com**.

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US Patent 7,185,481

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The Ninja® Professional Grade series of hand protection is engineered to provide the highest levels of innovation. Each of the offerings include a unique shell and polymer combination to best take advantage of the latest hand protection technology. Our Ninja® products offer the greatest assortment of dexterity, sense of touch, grip, thermal and cut protection.

Comfort & Softness | **Our Lightest Cut Level 5** | **Premium Cut Protection** | **Durability & Flexibility** | **Extreme Tactile Sensitivity** | **Flexibility in Cold Environments** | **Ultimate Wet & Dry Grip**

MCR Safety is the exclusive US supplier of Ninja® hand protection. and is a licensed supplier of gloves made with Dyneema®

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CIRCLE 99 *FOR **FREE** INFO*

What's in a name?

It could be a hazard.

Many of our competitors label their general purpose and cut resistant gloves with the same brand. This can lead to an incorrect selection when both types of gloves are being dispensed in the same plant.

Each of our gloves carries a different brand so job safety descriptions can be accurately written and easily followed without confusion.

Even our company name is absent so as not to interfere with accurate identification.

Preventing hand lacerations requires proper protection. Making sure that the protection is accurately identified is as important as the protection itself.

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CIRCLE 97 *FOR **FREE** INFO*

By WILLIAM TRAINER,
President, International Glove Association

Like **Hand** in Glove

The International Glove Association and its members strive to bring top quality products to end-users

The economic recession of 2009 impacted every region of the world with manufacturing affected the most. In the United States the economic recovery has begun, ever so slowly, however unemployment remains very high with 10 million people still looking for work. The approximate 100 million people still working in hospitals, restaurants, construction, manufacturing and all the other vocations are in need of protection from a variety of elements and dangers. Some of those hands and arms are more at risk than others, but that doesn't minimize the need for protection of every individual.

With depressed business levels, it is more important than ever for businesses to controls costs associated with safety. The costs from employee injury are most often avoidable with proper, cost-effective protection, and the International Glove Association's member companies are the best option of experience, quality and leading technology to address the issues.

New gloves for evolving needs

Each year new gloves are developed to address evolving needs, to reduce costs or to improve safety performance for current applications. Hand protection is a very dynamic industry with many developments, and users of such products are best served by the members of the IGA — hands-down.

With a mission to build an association that improves the manufacturing and distribution of hand protection, the IGA studies, clarifies and recommends government action to help promote proper glove selection and use. We also develop marketing and management programs for our member companies to improve employee knowledge, service skills and quality performance.

Origins of IGA

Founded in 2003, the IGA was originally formed two years earlier when glove industry leaders met to discuss the formation of a new, all-inclusive organization. Members of the International Hand Protection Association (IHPA) and the National Industrial Glove Distributors Association (NIGDA) saw major benefits to be gained by combining the strengths of the two associations.

Today, the IGA represents all elements of the hand protection industry, including manufacturers, distributors, importers, exporters, manufacturers' representatives, and suppliers to the hand protection industry. This combined strength of all the elements in hand protection is singularly focused on effectively serving your hand protection needs.

As we rebuild our economy through 2010, providing new products and education for safety associates and front-line workers on the benefits of effective hand protection, the IGA will contribute to the national recovery effort. ISHN

RESOURCES

"The Complete Guide To Cut-Resistant Hand Protection," a revision of the original 1994 NIGDA book

This guide presents a summary of pertinent information to aid in the selection of the right cut resistant hand protection for the application.

"The Complete Guide To Leather Gloves"

The Leather Facts Handbook serves as a factual guide to understanding the use of leather as it pertains to hand protection. The facts cited in this book were generated from Leather Facts, Leather Technician's Handbook, OSHA and other reputable sources.

"The Complete Guide To Understanding And Selecting Coated Work Gloves For Hand Protection," the revision of the 1997 NIGDA edition

"Coated Work Gloves Handbook" is intended to provide information necessary to make glove selection decisions with updated information of standards and new technologies and information to aid in selecting hand protection.

"The Complete Guide To Textile And String Knit Gloves"

The Textile & String Knit book is in its final phase now, and will include newer materials such as bamboo.

For more information on these valuable hand protection resources, contact the International Glove Association, Phone: (814) 328-5208; fax (814) 328-2308; email gloves@windstream.net; website: www.iga-online.com

Pick the **right glove**

continued from page 24

teristics and thousands of combined requirements for chemical-resistant glove fabrics. In general, chemical-resistant gloves that do not have a textile substrate offer greater dexterity and touch sensitivity than textile-lined, polymer-coated, chemical-resistant gloves.

Sometimes a generalization can be made based on the chemical class such as:

- Butyl or laminate gloves work best for ketones.
- Nitrile works best for aliphatic hydrocarbons or fuels.
- Viton or laminate gloves work best for halogenated hydrocarbons or aromatic hydrocarbons.
- Neoprene works best for most acids and caustics.

When choosing gloves for the aqueous chemicals used in janitorial/sanitation operations, a number of glove materials work very well, including glove shells coated with NRL, nitrile, neoprene and PVC. For the chemicals used in the automotive industry such as oils, greases and fuels, nitrile is the best overall choice.

General-purpose materials

Contemporary general-purpose glove materials are more durable, better fitting, more comfortable and, in some cases, more launderable than ever before. At the same time, there are material fabrications and combinations to meet virtually every need.

General-purpose glove liners range from traditional cotton to nylon to cut-resistant fibers, often in combination with a fiber that lends elasticity. The liners or shells are often coated with a second material to add specificity to the glove. Sometimes the coating covers the entire glove, but most recently coatings include everything from single-dipped to multi-dipped to flat-dipped (palm-coated) to three-quarter-dipped (over-the-knuckle protection) to combinations of palm and fingertip coats. The coating material can be NRL, nitrile or any one of a number of other substances. Some general-purpose glove fabrics are impregnated with vinyl.

A new innovation in general-purpose glove coating materials, sponge nitrile is valued for its ability to absorb oil, thus providing exceptional grip in oily, slippery industrial applications.

Thermal fabrics

Whether the job calls for protection from heat or cold, there is a glove fabrication that's up to the job. For example, there are now glove materials that provide protection up to 500° Fahrenheit for hot castings for intermittent heat, lab sampling with hot glassware or moldings, plastic molding manufacturing, and some food processing applications.

On the other end of the spectrum, gloves made of insulated nitrile, neoprene, NRL and PVC all provide protection from cold. Liner fabrics for these gloves range from heavy-duty fleece to cotton jersey or cotton jersey with foam insulation. Knit cuffs add to the cold-protecting comfort on many glove models.

High-tech fabrics

The past 50 years' growth of the high-tech industry has led to development of fabrics to meet the specific criteria of these environments. Many of these materials are anti-static with special formulations designed to prevent discharge of static electricity, thereby protecting sensitive parts.

Ongoing innovation

The process of innovation in materials for hand protection is a continuum. Going forward, those charged with the safety of worker's hands can expect to see more and more materials developed to meet increasingly demanding specifications. ISHN

Dave is product development manager for Best Glove Inc. (www.bestglove.com). A 20-year industry veteran, Dave is responsible for coordinating Best Glove's new product development in general-purpose, disposable, chemical-resistant and specialty glove lines. Visit Best Glove's www.chemrest.com database for helpful information on proper chemical-resistant glove selection.

Hand protection *What's so hard about hand hygiene?*

By DAVE JOHNSON, Editor

"Hand hygiene saves lives," exclaims the slogan on the Centers for Disease Control and Prevention (CDC) Hand Hygiene in Healthcare Settings Web site — http://www.cdc.gov/handhygiene/.

But like many safety slogans, this one too is often ignored. "Adherence to hand hygiene recommendations is unacceptably low, usually well below 50 percent," reported a 2004 article in the *Annals of Internal Medicine*.

The CDC's 2002 guidelines are clear and straightforward, involving few steps, and should promote widespread acceptance and compliance. Especially considering the risks that are well-established, infections unintentionally acquired by patients during hospital stays (nonsocomial infections) occur far too frequently, and can be deadly.

Sobering statistics

CDC estimates if 35 million patients are admitted each year to the approximately 7,000 acute-care institutions in the United States, the number of nosocomial infections — assuming overall attack rates of 2.5 percent (2.5 infections per 100,000 patient days), 5 percent, or 10 percent — would be 875,000, 1.75 million, or 3.5 million, respectively.

If 10 percent of all hospital-acquired infections involve the bloodstream, 87,500, 175,000 or 350,000 patients acquire these life-threatening infections each year. Anywhere from 17,500 to 70,000 patients die each year due to these bloodstream infections, according to various estimates.

Compliance riddle

If your employees knew that following certain personal protective equipment and personal hygiene guidelines could prevent untold illnesses and deaths to innocent people, wouldn't compliance be easy?

You know better than that. Even when the employee's own life, or the lives of coworkers, can be saved by PPE compliance and adherence to guidelines, people don't always follow directions and act like we think they would. Why?

Lessons in hand hygiene

Perhaps there are lessons in compliance and human nature that pertain to hand protection and wearing gloves, and other types of PPE, to be learned from an article, "Hand Hygiene among Physicians: Performance, Beliefs, and Perceptions," published in the *Annals of Internal Medicine* in 2004.

Here is a synopsis of the CDC's recommendations to physicians and other healthcare providers:

- When healthcare personnel's hands are visibly soiled, they should wash with soap and water.
- The use of gloves does not eliminate the need for hand hygiene. Likewise, the use of hand hygiene does not eliminate the need for gloves.
- Gloves reduce hand contamination by 70 percent to 80 percent, prevent cross-contamination and protect patients and healthcare personnel from infection.
- Handrubs should be used before and after each patient just as gloves should be changed before and after each patient.

Researchers for the article observed 163 physicians during 573 patient-care episodes, which provided 887 opportunities for hand hygiene. Here's what they found:

Research findings

- Overall adherence to hand hygiene guidelines was 57 percent. Adherence was significantly higher when a handrub solution was easily accessible. (This could suggest something about the placement and accessibility of your PPE.)
- Most physicians reported that they were aware of the risk of infection to the patient resulting from nonadherence (85 percent), that they intended to adhere to guidelines (77 percent), and were motivated to improve their adherence level (74 percent).

This is a situation common to many safety pros: You have employees who are aware of risks, are well-intentioned when it comes to following safety guidelines, and say they are motivated to do a safer job. So why are only slightly more than half of these particular employees studied (physicians) behaving according to safety norms?

Cultural barriers

System and cultural influences affect compliance, according to the article. For example, a high workload and fast work pace was associated with nonadherence by physicians. If handrubs were not conveniently accessible, usage declined. Junior staff and students who were taught to handwash abandoned their habit when others, especially more senior staff, did not bother.

Only 44 percent of physicians in the study considered themselves possible role models for good hand hygiene practices. According to the article — and as many a safety pro will attest — the role model could play a pivotal role in changing human behavior.

In your workplace, how many of your employees are role models for wearing gloves, hearing protection, eye protection, and so on? When time pressures and workloads are barriers against PPE compliance, role modeling can be a strong, positive activator for safety. ISHN

Keep **hands safe** at a productive pace

Comfort is key to compliance

By TOM DRASKOVICS

When it comes to selecting hand protection products, comfort is a key factor for decision makers. After all, no matter how protective gloves may be, they are ineffective if workers remove them due to discomfort.

Comfort may be defined as "freedom from pain, trouble or anxiety." When considering hand protection, however, gloves are usually regarded as comfortable when a worker can perform his or her tasks without removing them.

So what features make some occupational gloves more comfortable than others?

What happens when gloves are uncomfortable?

When gloves are uncomfortable, workers remove them, exposing their hands to job-related hazards. Anytime workers remove gloves for one task, there is a real risk that they might not put them on again for another task, thus increasing the chances of a job-related injury.

In a larger company that employs a safety director to oversee glove selection and use, hand protection compliance is less likely to be an issue. A smaller company, however, may encounter problems with compliance because no one notices when workers wear gloves for several tasks and remove them for the rest of the shift. In general, workers are more likely to keep gloves on when the products are comfortable and appropriate for the task — and when someone is there to confirm that they are using them correctly on a continuing basis.

How important are ergonomics?

Various studies indicate that ergonomically designed hand protection can help reduce repetitive motion injuries (RMIs) and related musculoskeletal disorders — especially in older workers who may not be able to manipulate objects as well as they once did. This is why ambidextrous gloves are inappropriate for most tasks within a manufacturing facility. These gloves are not designed in the actual shape of the hand, and therefore, do not provide the support needed for most tasks.

Grip is a critical ergonomic factor. When gloves do not allow workers to securely grasp objects, individuals will apply more force. This can result in both fatigue and RMIs such as carpal tunnel syndrome and tendonitis. Special coatings are applied to some gloves to allow workers to effectively grasp wet and oily objects without applying a significant force.

What about fit?

To achieve a high level of comfort, gloves should fit and function like a second skin. As mentioned above, ambidextrous gloves are not designed for the hand's natural configuration and actually have the thumb in a neutral position in line with the other fingers, thus placing force against the thumb during work. Properly fitted gloves follow the hand's natural configuration and help reduce mechanical stress.

Hand protection products that are too small can restrict movement and blood flow, leading to cramping, fatigue and perspiration. Gloves that are too large may be bulky and can significantly decrease dexterity, causing workers to strain when they perform certain tasks. One size glove will not fit all workers which is why it is important to consider gloves that are available in half sizes as well as whole sizes.

How important is moisture management?

Whether they work inside or outdoors, workers with hot, sweaty hands are uncomfortable. Individuals are more likely to keep gloves on their hands when the products can breathe and when they offer features such as moisture-wicking capabilities, stay-dry linings and cooler fabrics.

Some engineered yarns and fabric structures ensure moisture management. Synthetic fibers such as polyester, polypropylene and nylon that are used in active wear to manage moisture are also widely used in knitted gloves. Gloves with Dyneema® are often described as lightweight with the ability to keep hands cool and dry.

Can certain manufacturing techniques/materials promote greater comfort?

Yes. Some glove manufacturers plate the inside of a glove with a material different from that used on the outside. This is especially popular with engineered fabrics such as Kevlar® because it allows the manufacturer to provide a soft, nylon fabric inside the glove for greater comfort.

Advancements in knitting technology allow manufacturers to vary the density and stitching tension in areas where workers need more room, such as the knuckles and the back of the hand. Gloves that incorporate this type of stitching are more comfortable and provide greater flexibility and dexterity.

Although thinner, lighter fabrics are often associated with greater comfort, workers will consider these fabrics to be comfortable only when they provide the level of protection needed for the application. Individuals employed in a metal fabricating plant, for example, will appreciate thinner fabrics only if they provide sufficient cut protection.

How can decision-makers make the best choices?

Descriptions and terms in the product literature can help decision makers determine if a pair of gloves will provide the necessary degree of comfort. Gloves with a high level of dexterity and tactile sensitivity are more likely to provide comfort for workers in the automotive industry who must pick up and handle small pieces on an assembly operation. Gloves that offer protection from the cold are more comfortable for workers performing tasks in a refrigerated environment, while products with a nitrile coating will enhance comfort for workers handling wet and oily parts.

Because a single glove style is unlikely to provide all the attributes needed for a variety of tasks, it is important to conduct product trials among a cross section of workers. Workers should receive training about the products' protective advantages so they can perform tasks with a higher level of confidence.

To conclude, protective gloves are like athletic shoes — they provide certain performance characteristics for specific tasks. Just as an athlete wants shoes with performance characteristics that will enable him to win a race, the plant worker wants gloves that will allow him to perform various tasks safely and comfortably at a productive pace. ISHN

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