



**G**loves protect hands from injuries. If only it was as simple to say that if all workers, from medical to industrial and everything in between, would just wear gloves, then more than 1 million hospital emergency visits by U.S. workers per year (according to the Centers for Disease Control and Prevention) could be avoided.

Are workers wearing gloves? Are they wearing the wrong gloves, and if so, how do they know? If only there was an easy answer.

In industrial and professional worlds alike, workers demand gloves that provide multiple degrees of protection. For example, a worker may need a glove that not only is heat resistant, but also is chemical resistant as well. Plus, workers demand that gloves not only protect their fingers and hands, but provide them with better performance. In today's specialized world, how do you select the right glove to fit the job?

# A Practical Guide to Hand Protection

Why, with the availability of personal protective equipment and training, do hand injuries remain the second most common work-related injury?

**By Joseph D. McGarry**



In an attempt to educate and clarify the different glove options available, think of this article as a practical guide to hand protection. Use this information to ask the right questions of your glove supplier to ensure you and your workers get the best gloves for safety as well as performance.

### Coated Gloves

**C**hemical- or liquid-proof gloves essentially are coated gloves. To be completely chemical or liquid proof versus just chemical and liquid resistant, the gloves must be fully coated. As a fully coated glove, they either can be supported or unsupported, which means with or without a lining. Supported gloves can have a variety of fabric linings that add to the comfort



and fit of the gloves. The key with coated gloves is to make sure that with whatever coated glove you use, the coating is resistant to the types of chemicals that are present.

These gloves have several coating options including latex rubber, nitrile rubber, polyurethane, PVC and neoprene. Other, less common coatings that also are used include PVA, butyl or Viton.

**Latex rubber** is a low-tech glove that works. Although it is waterproof, it will blister and delaminate when in contact with petroleum-based products. The nature of latex allows for the gloves to be manufactured with

a crinkled or exaggerated texture to increase the gripping surface. And because they are inexpensive (\$1 to \$3 per pair), they can be disposable if necessary. Some applications for latex-coated gloves include construction, general assembly, material handling, landscaping and gardening.

**Nitrile rubber** (NBR) resists grease, oil and other petroleum-based products, and is water resistant or waterproof (if fully coated). The coating is applied to the glove either as a foam coating or a solid-finish coating. The variation allows for increased gripping in the foam version, making this coated glove a good choice for

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tasks that require a high degree of dexterity and sensitivity where a grip is important, such as handling small oily or wet parts.

**Polyurethane gloves**, due to the polymer strength, provide extra abrasion resistance and extended wear. Manufactured from a cleaner polymer, they offer a softer feel. In addition, the polymer can be harder to puncture, providing increased protection. The coating does provide waterproof protection, but only limited chemical resistance. The combination of strength and cleanliness makes these gloves ideal for high-tech and electronic assembly work, inspection and quality control and an excellent choice for use in critical environments.

**Both PVC and neoprene** offer excellent chemical-resistant properties. Polyvinylchloride gloves frequently are used in the petrochemical industry. Neoprene gloves provide excellent chemical resistance to a broad range of hazardous chemicals, including acids, alcohols, oils and inks. Although

neoprene gloves can offer good grip, they generally are thicker and heavier.

Coated gloves coupled with a lining such as cotton or cotton/polyester blends, textured nylon, Aramid and Dyneema fibers provide a mixture of levels of protection and comfort. Also, coated gloves are available in a few versions: full-coverage for complete liquid-proof or chemical-proof protection; palm, finger and fingertip coverage for a breathable glove; and palm, fingertip and knuckle coverage. Whatever the coating coverage, all can be textured or have thicker finishes for better gripping.

Beyond the specialized coated gloves as mentioned above, there is a medley of coated jersey gloves or canvas coated gloves (often worn by painters or your average do-it-yourselfer) that are available in every hardware store.

### Cut-Resistant Gloves

**C**ut-resistant gloves are used when workers are at risk to be sliced or cut by equipment or the products they are handling. For food processing, industrial or assembly applications, using gloves with Kevlar or Dyneema fibers are preferred because of their comfort level. There also are Kevlar knit gloves containing metal fibers that offer higher cut-resistance properties. And for the highest degree of cut resistance, there are

heavy, metal mesh gloves used within the meat and poultry and food

preparation industries. One final comment regarding cut-resistant knit gloves used in food prep and processing: it is preferred if the



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gloves are made with a continuous filament, cut-resistant fiber (not spun fiber) for an easier to clean glove.

While Kevlar offers a high tensile strength that is five times stronger than steel, Dyneema fibers, a brand of polyethylene fibers, are engineered to be 10 to 15 times stronger than steel by weight. Both types of fibers, when blended with other fibers such as Lycra, can be very form fitting. Often these synthetic fibers tend to be slippery, so while they protect against

cuts, the addition of the coating ensures a safer grip.

### Disposable Gloves

**D**isposable gloves, often used in food processing or assembly as well as a multitude of other industries, are available in latex rubber, nitrile, polyethylene, PVC and vinyl.

With respect to food



processing and handling, disposable gloves are available in a variety of colors to prevent cross contamination as well as detection. Also, there are specialized detectable disposable gloves made of non-metallic, metal-detectable material that ensures that if torn or cut, small pieces of the gloves do not go undetected in the food when it passes under metal detectors.

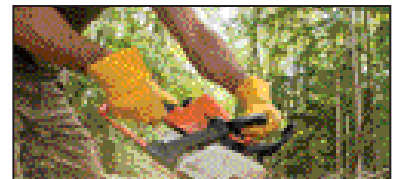
Polyethylene gloves, often called cafeteria gloves, are the cheapest

disposables used for food assembly and preparation at restaurants or cafeterias. In beef and pork processing specifically, synthetic nitrile gloves are a better choice all around, since the proteins in the meat will break down latex in a matter of hours.

Disposable gloves also are used in industrial and healthcare applications. For industrial applications when there is the presence of oil or petroleum-based products, nitrile disposables must be worn because latex breaks down in oil. For the healthcare industry, latex often is used; however, nitrile or PVC can be used if there is a concern of latex allergies.

### Other Types of Gloves

**A**nti-vibration gloves, as their name states, are used for protection for highly specialized tasks such as operating chainsaws, grinders, nail guns, sanders and any machinery that produces high level of vibrations or where the individ-



ual is exposed to excess vibration. These gloves provide extra padding to help prevent hand-arm vibration syndrome (HAVS) that often occurs from repeat exposure to vibration.

**Electrical hazard gloves** should be used at all times when working on general electric equipment, elevators, moving walkways, swimming pools, fountains, branch circuits and

switches, carnival rides, emergency power systems and solar photovoltaic systems, etc. One interesting new application where electrical gloves must be worn is when working on hybrid vehicles with high voltage batteries.

**Electric hazard gloves** are rated by section 70E of the NFPA and are classified based on amount of voltage that a worker might be exposed to if shocked by an electrical current. And, of course, OSHA – 29 CFR, part 1910.138 is very clear that these gloves are necessary.

**General purpose gloves** are available in jersey, canvas or string knits, and are in placed in two basic classifications: drivers' gloves and leather palm gloves.

**Drivers' gloves** (note: drivers is a generic term for this type of glove) are thin leather gloves for general-purpose use. They allow good dexterity, while providing protection at the same time. They protect the entire hand from abrasion and punctures, and are a dependable, comfortable glove for a wide variety of jobs. Drivers' gloves are available in various types of leathers and can be unlined or lined for cold weather.

**Leather palm gloves** provide maximum protection against abrasive and puncture hazards. They are made of durable cotton or canvas with leather palms and fingers. These gloves come with either knit wrist cuffs, reinforced 2½-inch safety cuffs or reinforced gauntlet cuffs and are available in a lined version for cold weather.

**Heat-resistant gloves** are an entity unto themselves. There are heat-resistant gloves that are flame resistant, high heat resistant, convection heat resistant or all three. The low end of heat-resistant gloves are terry cloth gloves similar in feel to thick towels or kitchen pot holders. Kevlar blends, as well as other similar fibers, are cut resistant as well as heat resistant. And of course, there is a whole variety of high-heat gloves used in foundries, as well as welder's gloves and firefighter gloves, which all are made of high-duty leather with heat liners. One newer technology – carbon-X fibers – is widely used in high performance motor sports and is becoming very popular for high-heat, flame and

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spark resistance. They also are very comfortable and thin, allowing for extra dexterity.

**Welding gloves** are made of leather with heat-resistant panels. There are MIG and TIG models, as well as thinner gloves for working with different types of welding or small piece welding. These thinner gloves allow for a higher level of dexterity that is required when working with intricate or small items. A special feature of effective welding gloves is fully welted seams sewn with Kevlar fibers, which



are five times stronger than steel and flame and heat resistant. These fibers protect the seams from degeneration due to exposure to abrasion, heat, sparks or flames.

**High-visibility gloves** are available in safety orange or lime colors and come in day or nighttime versions. The difference is that nighttime versions have retro-reflective patches or elements to reflect back light beams.

**Mechanics gloves** (which are used by workers other than mechanics as well) are made of hybrid and composite materials, including leather, synthetic leather, waterproof materials, high-performance fibers or synthetic grip finishes. These gloves are thin, which allows for high dexterity, and are very durable. There are finger or fingerless versions and some offer additional grip layering or patterns for handling boxes or sheet metal. And because this is a generic catch-all name for an all-purpose glove, there is a variety of versions and different looks.

### More than Just Hands

**A**rm protection, or sleeves that offer cut and heat resistance, often is overlooked when selecting gloves. There are gloves that have sleeves built in, but there also are sleeves that can be purchased separately.

There are several good reasons beyond price to purchase the sleeve separate from the glove. For example, sleeves may last longer than the gloves because of less exposure to abrasive materials or heat. Therefore, replacing the gloves when needed is more economical than purchasing a glove that has the sleeves built in. Also, some workers may only need one sleeve because only one arm is exposed to hazardous elements. In addition, there are several different versions of weight and cut and heat resistance that may be appropriate for the application that allow for better fit and comfort.

As you can tell, gloves are not just a one-size-fits-all fix to hand protec-



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tion. It takes a deeper understanding of the application that the worker is doing when the glove is worn to even begin to select the right glove.

With gloves, ergonomics and fit are big issues. If the glove is not sized correctly, workers might over compensate by gripping harder, which could lead to other hand problems and injuries beyond the ones that the glove is being worn for in the first place. And so many times, gloves are removed because the fit is not right, making the risk of injury imminent, even when safety directors and managers are trying to provide the right safety gear.

In summary, as a safety professional, it is your duty to educate yourself about the right tools out there to protect your workers or yourself. The vast amount of information about gloves – as well as the extensive variety of gloves available – can be daunting. Make sure you ask the right questions when selecting a glove for a particular applica-

tion. Using the right glove for the task is worth the investment compared to the potential alternative – hand injuries.

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