Employee Safety

How to Choose the Right PPE: Safety Gloves

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What You Need to Know:

In 2016, ANSI released a revised ANSI/ISEA 105-2016 standard for hand protection changing the cut level rating scale and the method of testing for cut resistance.
The 2011 standard had five cut resistance levels ranging from 1 to 5, while the 2016 standard added additional levels, which now range from A1 to A9, to further differentiate the amount of cut resistance.
The higher cut-resistant material is stiffer and sometimes a lot thicker than the lower cut material, so you lose dexterity or tactility.
Abrasion resistance is rated from 0 to 6, while puncture resistance ranges from 0 to 5.
Gloves are now rated in three categories—Type A, Type B and Type C—based on their permeation performance, and labeled with a fuming beaker pictogram with the code letters for the test chemicals used.

Protecting workers' hands on the job is an incredibly challenging aspect of a safety program. Learn how to find the right gloves for fit and protection level that also meet the standard you have to follow.

Who would think that choosing the proper hand protection in the workplace would be more complicated than grabbing a pair of rubber-coated cotton gloves for $1.99 at the local hardware store?

But safety managers often struggle to ***select the optimal gloves*** for fit, use and compliance. For one thing, the number of choices is vast—and the standards governing personal protective equipment (PPE), including hand protection—are not always easy to decipher.

On top of that, once they are chosen, the gloves may not get used because of fit and comfort issues, which can lead to injuries in the workplace.

OSHA has a ***general requirement*** for employers to "select appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes."

To do this, OSHA requires that employers evaluate the performance characteristics of the gloves, in light of specific job conditions and the potential hazards associated with them.

The American National Standards Institute (ANSI) and the International Safety Equipment Association (ISEA) have collaborated to develop voluntary industry consensus standards to meet OSHA requirements. In 2016, ANSI released a revised ***ANSI/ISEA 105-2016 standard*** for hand protection, which changed the cut level rating scale and the method of testing for cut resistance.

New Cut Resistance Levels for Safety Gloves

The 2011 standard had five cut resistance levels ranging from 1 to 5, while the 2016 standard added additional levels, which now range from A1 to A9, to further differentiate the amount of cut resistance.

"Because this is a voluntary standard, manufacturers can continue to follow the older version of the standard, or they could switch to the newer one," explains James Thompson, lab manager in research and development for physical and application testing at Ansell in Pendleton, South Carolina.

Safety managers evaluating gloves will note that ***new products*** are coming out rated to the 2016 standard, while manufacturers are gradually transitioning older products to the new system, so a glove may be listed under either version of the standard.

Gloves may also be rated under the European EN 388 standard, with ***cut resistance*** ratings ranging from levels A through F.

How to Ensure Gloves Are Worn: Fit for Size, Comfort and Grip

“Statistics still seem to show that most hand injuries happen when people are not wearing gloves or not wearing the right gloves—like wearing a leather glove when you need cut resistance,” Jason Thompson says.

To prevent this, employers not only need to select the right gloves, but also take into consideration comfort of the employee.

“Typically the user would be willing to wear a glove only if it’s comfortable,” Kavitha Elugula says. “But at the same time, there are some hazards that need high-level cut resistance or high-level chemical resistance, where you have to compromise on the comfort.”

Glove size is important, too.

“Some manufacturing facilities might only order one size and everybody must use the same ones,” she says. “But the problem is that if you are not using the right size, the comfort and dexterity is gone.”

If gloves are too loose, the user won’t be able to grip properly, or if too tight it may cause ergonomic problems, Elugula says.

“When sweating is a concern, some gloves are made with a technology that absorbs sweat, and supported gloves with liners would help in this case, too,” she says.

Though powder helps release the gloves faster, many users don’t like it because the powder makes a mess. Newer-style gloves are treated with chlorination, which helps them slide off more easily, explains Elugula.

No matter how uncomfortable, however, OSHA requires employers to provide appropriate personal protective equipment, including gloves, for each employee, and to ensure that it is worn whenever employees are exposed to hazards.

“Our hands are the way we interface with the world for most of us, and good gloves help protect that,” says Thompson. “The challenge is making sure users get a glove that’s comfortable and can do the job properly.”

Glove Selection Tool

Need help selecting the right gloves? Have no fear: Use our handy ***interactive glove selector*** to sort through all of the options and conditions.

Cut-Resistant Gloves That Still Provide Dexterity

"If you want more cut resistance, you either put more material in the glove or make the fabric harder," Thompson says.

"The challenge has always been the higher cut-resistant material is stiffer and sometimes a lot thicker than lower cut, so you lose dexterity or tactility, and you can't feel when picking up something small like a bolt," he says.

"Kevlar, HPPE and Dyneema are very high-strength yarns that do well on cut resistance," Thompson says. "But now we have gloves made with thin fiberglass, thin steel wire and filled yarns that have really good cut resistance with thinner fabric."

Choosing the Right Safety Gloves for Gripping Dry and Wet Surfaces

Thompson suggests using a combination of cut resistance and grip for ***selecting a glove***.

"In most cases when handling sheet metal, grip is important because cuts may result from accidental slips," he says. "For example, in a metal shop, if they're using a cutting tool that adds a light mineral oil coating for cutting, the grip becomes very different."

For a dry surface, the way to maximize grip is to maximize surface area in contact with the material, so you want the flattest surface on a glove, Thompson explains.

"However, if you add a bit of oil on a flat surface you have no grip whatsoever, so you need an uneven surface with channels for the oil to move away, with high points that poke above them to make contact with the surface," he describes.

Selecting the Right Abrasion and Puncture-Resistant Gloves

"In North America, the ISEA established cut protection, abrasion protection and puncture protection as the three key tests to rate safety gloves," he says.

The new ANSI standard leaves the test levels for abrasion and puncture intact from the previous 2011 version. Abrasion resistance is rated from 0 to 6, while puncture resistance ranges from 0 to 5.

"The performance-level protection factor for abrasion resistance is based on the average number of cycles of the testing equipment required to abrade through a minimum of five specimens," clarifies Kavitha Elugula, a technical expert with Ansell Chemical Guardian.

"The higher the number, the better the abrasion resistance, and the better the glove," she says.

If you are looking for additional guidance on cut resistance, you can download the ***ISEA's Cut-Resistance Calculator Template***.

Finding the Right Heat-Resistant Gloves

One of the most likely heat hazards to be encountered on the shop floor is contact heat, Thompson points out, which occurs when reaching into an oven to take out a part after it has been heated or sintered, or through incidental contact when brushing against a hot piece of equipment.

"The ISEA standard includes several ***heat resistant categories***, but in my experience, most people stick

with the European standard EN 407-2 for contact heat resistance," Thompson says.

"To pass the EN 407-2 performance level 1 standard for resistance to contact heat, the inside of the glove needs to go up less than 10 degrees Celsius when holding a 10 C object for 15 seconds," he says.

The standard also covers other types of resistance to heat hazards, including burning behavior, radiant and reflective heat and contact with molten metals, each with performance levels ranging from 1 to 4.

Chemical-Resistant Gloves

The ANSI/ISEA 105 standard includes a test for permeation resistance, which measures the rate at which chemicals pass through the glove material. Longer breakthrough times indicate materials with better chemical permeation resistance, with levels ranging from 0 (less than 10 minutes) to 6 (greater than or equal to 480 minutes).

Recent changes were made to the European standard, EN 374: 2016, which added six additional test chemicals to the list of 12 chemicals that were previously included in the chemical permeation standard.

In addition, the beaker symbol that was formerly displayed on a glove to denote low chemical resistance has been removed from the 2016 standard. Instead, gloves are now rated in three categories —Type A, Type B and Type C—based on their permeation performance, and labeled with a fuming beaker pictogram with the code letters for the test chemicals used.

Type C gloves can pass the leak test for 10 minutes with at least one of the test chemicals. Type B gloves must perform 30 minutes against at least three of the chemicals, and Type A gloves must last 60 minutes against six of the chemicals on the list.

"The choice of a ***chemical resistant glove*** depends on the length of exposure, the hazard level of the chemical, the temperature of the chemical, and whether it's only a splash or full immersion," Elugula explains. "For example, if an employee is just using the glove to wipe something with acetone, a disposable glove could stand up to the chemical for a couple of minutes, but if they are immersing the glove in an acetone tank, I would never recommend anything disposable."

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> James Thompson
> Lab Manager, Physical and Application Testing, Ansell

Finding Safety Gloves That Fulfill OSHA's PPE Requirement

To fulfill OSHA requirements, a safety manager in a metal shop, for example, would have to figure out what hazards exist in order to determine which safety gloves to choose.

"Each application has different user needs and employers should look at which gloves meet the most or all of the requirements," Elugula says.

"If high heat is involved, you've got to make that a priority over the other parameters," Thompson points out.

Beyond heat and chemicals, if employees are working with metal they want to make sure the glove has

a high cut and abrasion resistance. If working with something very small, they need dexterity.

“Safety managers in a metal shop would tend to make their decision on the cut hazard level they expect,” Thompson says. “If you’re just moving sheet metal, the A2 level might do it, but if you’re getting too many cuts with that, then crank it up to a higher cut resistance.”

Do you better understand how to choose the right gloves for the job? Tell us what you’ve learned.