Hand Protection

Training Guide

A GUIDE TO POLYMERS

Neoprene: (Poly-Chloroprene, CR) Neoprene gloves are strong and durable providing excellent hand protection from physical hazards such as cuts and abrasions, flexible and soft like natural rubber but also provide excellent chemical resistance.

Recommended for protection from hazards associated with exposure to organic and inorganic acids, excellent protection from solvents, oils, greases and petrochemicals. Neoprene gloves resist degradation from ozone, sunlight and oxidation and remain functional flexible at temperatures ranging from -10° to 300°F (-23° to 150°C)

Nitrile: (Acrylonitrile Butadiene Rubber, Nitrile Buna Rubber, NBR) Nitrile is a versatile synthetic copolymer used to make a wide array of gloves used for a variety of applications ranging from heavy duty work gloves to ultra thin medical and clean room gloves.

Provides tough protection from physical hazards such as cut, puncture or abrasion. Designed for chemical resistance to petrochemicals (especially fuels) oils, greases, pesticides and other agricultural chemicals while proving excellent dexterity. The thicker a Nitrile glove, the greater its resistance to chemicals and function well in temperatures ranging from 25° to 300°F (-4° to 150°C)

PVC: (Polyvinyl Chloride, Vinyl) PVC is an economical synthetic thermoplastic polymer that is exceptionally durable for many jobs where a long wearing and inexpensive glove is required. PVC gloves provide excellent protection from limited chemical exposure and physical hazard protection. PVC gloves made with a comfortable cotton liner are both economical and durable and function well in temperatures ranging from -30° to 212°F (-34° to 100°C)

Natural Rubber: (Polyisoprene, NR)Natural rubber has excellent abrasion, cut and tear resistance as well as outstanding grip and temperatures resistance, flexible and soft, yet tough and durable. Provides excellent protection from hazards associated with exposure to water based chemicals such as acids and caustics. Do not hold up well in organic solvents, oils, greases or fuels. Natural Rubber maintains these attributes at temperatures ranging from 0° to 300°F (-17° to 150°C)

Butyl: (Isobutylene, IIR) The Butyl polymer has the tightest molecular structure of any polymer and provides excellent chemical resistance to gases and ketones.

Viton: (Fluoroelastomer, Fluor Carbon Elastomer - FKM) Vition was developed for its high temperature and used for extremely hazardous chemicals where no other glove works.

PU: (Polyurethane) PU foam is a spongy, cellular polymer, good abrasion resistance and toughness combined with elasticity.

FABRIC TYPES

Cotton: Natural cellulose. Flexible, soft and non-irritant, it protects against mechanical aggression, absorbs perspiration and comfort**.**

Nylon: Light elastic polyamide, low lint, quick drying, resistant to abrasion and deformation. Mixed with cotton and acrylic makes more flexible and extends its lifetime.

Kevlar: (Poly-paraphenylene Terephthalamide)Kevlar aramid fiber is an organic in the aromatic polyamide family. Combination of high strength and light weight, high chemical resistance and high cut resistance, flame resistant and self extinguishing. Kevlar does not melt but sensitive to UV light. Unprotected yarn tends to discolor from yellow to brown for prolonged exposure.

Spectra or Dyneema: Ultra-high molecular weight polyethylene fiber that offers maximum strength combined with minimum weight. Spectra or Dyneema floats on water, durable, resistant to moistures, UV light and chemicals. Also used in bullet resistant armor and clothing for police and military personnel.

Terrycloth: An extremely absorbent woven or knitted cotton fabric. Terrycloth is naturally cut resistant, offering effective protection as sharp edges roll over the high loops in the material. Superior cut and abrasion protection plus heat resistance. Stands up to repeated laundering with minimal shrinkage.

Aluminzed Fabrics; The ability to reflex 95% of radiant heat. Reduces the flow of ambient heat by 50% versus non-aluminized fabric.

Aluminzied Glass: Insulating fabric that provides strong protection from radiant heat, sparks, and molten metal splash.

Aluminzed Rayon: The most comfortable, flexible fabric for radiant heat protection in lower temperature applications.

Aluminized Kevlar: Abrasion and cut resistant fabric for radiant heat protection in mid-temperature applications.

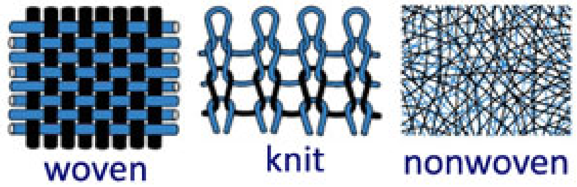
Aluminized Nomex: Though considered expensive. Very durable, providing to a cost effective material in the long run.

Aluminzed PBI: The highest heat resistant organic fiber. Comfort wear and abrasion resistance similar to Kevlar.

Aluminum Foil: Economical fabric for basic heat reflection and chemical and moisture resistance.

Know what type of protection; Ambient Heat - is surrounding atmospheric temperature.
Conductive Heat - is generated by direct contact with a hot surface.
Radiant Heat - is heat absorbed by objects struck by heat energy rays.

FABRIC CONSTRUCTION



Woven: Woven fabrics have two or more sets of yarns interlaced at right angles to each other. One weft thread. Economical and most widely used method of manufacturing fabrics.

Knit: Knit fabrics are composed of intermeshing loops of yarn. One thread from beginning to end. A good insulator and elasticity.

Nonwoven: Nonwoven fabrics or felts are composed of webs of fibers that are entangled or layered. Economical and good insulator.

GLOVE CONSTRUCTION

Clute Cut: Seamless palm made from a continuous piece of material. Back of glove has parallel seams. Finger side seams are toward palm side of glove. Provides roomy fit, greater ease of movement and comfortable gipping.

Gunn Cut: Seamless on back**,** separate piece from ring and middle fingers with seam at the base of the two fingers. Seam in natural hand creases allows flexibility. Finger seams away from palm increase gloves durability and wear life.

Ambidextrous: Construction similar to gunn cut but with thumb positioned perfectly on the side of the glove. Reversible allows glove to be warn comfortably on either hand.

THUMB STYLES

Keystone Thumb: A single piece of material sewn to form a thumb and then insert into a hole in the glove palm. Results in superior comfort and flexibility. A more expensive type of construction.

Wing Thumb: Cut from the same piece of material as the palm. Extends to the side when glove is laid flat. No seam on the wear surface means thumbs move freely. Follows the natural shape of the hand for comfortable gripping.

Straight Thumb: Cut as one piece with the palm, extending straight toward the wrist. Uses less material than the similar gunn cut, reducing cost of the glove. Primarily used in fabric gloves or in economy leather gloves.

CUFF DESIGNS

Roll Cuff: No textile lining unsupported gloves. Slip on and off easily. Prevent liquid getting back inside gloves.

Straight Cuff: Unsupported gloves. Primarily used in general purpose gloves.

Gauntlet Cuff: An extended safety cuff longer. Offer extra wrist and forearm protection from heat and lacerations.

Knit Wrist: Seamless, stretchable rib knit tubing made into snug-fitting cuffs. Snug fit prevent dirt from getting inside glove.

Slip On Cuff: Glove constructed without a cuff. Glove material extends down over the wrist area. Slip on and off easily.

Safety Cuff: General protection usually a stiff material. Provide good protection for wrist area plus ease of movement.

GRIP PATTERNS

Smoot: In coated gloves, a non-patterned. Provides excellent chemical and abrasion resistance.

Rough: Coated glove receiving a special second dip into PVC compound. Provides superior grip during wet applications.

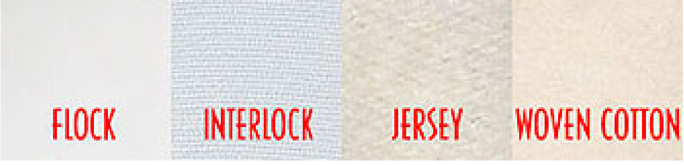
Diamond: Heavier version unsupported gloves. Provides excellent grip on wet and dry.

Sandy: Textured PVC coating on supported gloves. Provides incredible grip dexterity and chemical protection.

Foam: Lightweight Nitrile synthetic rubber coated gloves. Provides exclusive breathable grip during dry applications.

Texture: Random raised pattern in natural rubber latex gloves. Provides grip and dexterity under dry and wet conditions.

LINERS



Flock: Liner formed in unsupported gloves by blowing snipped bits of soft fiber cotton into adhesive coating inside gloves. Absorbs perspiration and makes gloves easy to slide on.

Interlock: Cotton knit liner without a napped side. Feels cooler than a napped fabric. Comfort and easy to slip on after laundering.

Jersey: Cotton knit jersey fabric sewn into glove with nap out. Napped fabric adds softness. Absorbs perspiration and increases warmth. Knit stretches for dexterity.

Woven Cotton: Heavy weight lining enhances glove flexibility and integrity. Performs well in high temperatures. Designed for harsh environments.

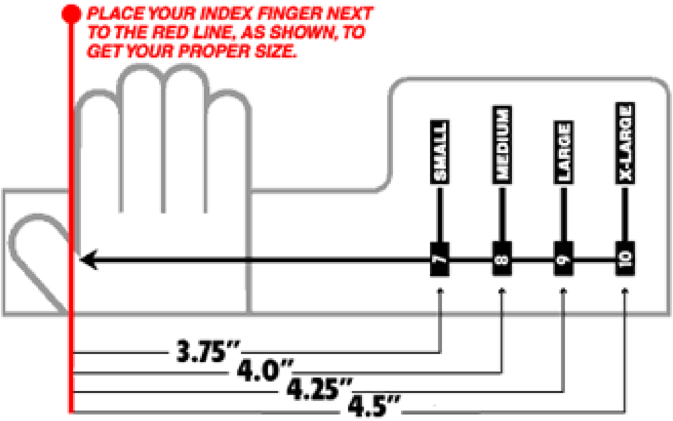
SUPPORTED and UNSUPPORTED GLOVES

Supported Gloves: Have a knitted or woven liner, placed over the hand form, prior to dipping.

Unsupported Gloves: Are made by dipping a hand form directly into a tank containing a polymer in liquid form.

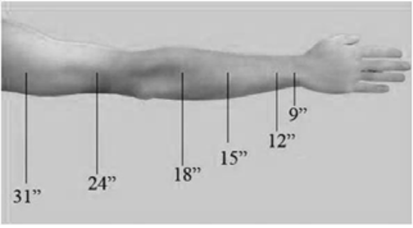
Sanitized® is a process which prevents the growth of bacteria and fungi, prolongs the service life of the treated product and helps to protect your product from germs and ill smell.

FIT GUIDE



Convenient sizing chart to ensure proper fit and comfort to provide the dexterity you need to do your job effectively.

How long do you need the glove to be?



GLOVE CATEGORY

Disposable Gloves: For single use only

General Purpose Gloves: For materials handling, maintenance, assembly, inspection and general plant use

Chemical Resistant Gloves: For material handling in acids, oils, solvents and general utility

Heat Resistant Gloves: For material handling in hot objects, molten metal, plastic extrusion and heat treating industries.

Cut Resistant Gloves: For handling sharp-edged objects, glass or scrap metal and cutting applications

Ranking:-metal mesh>composite yarns>high strength fibers>nylon>cotton>leather>latex

Specialty Gloves: For specialized applications in insulated line, electricity and vibration absorption

SWAT

Chemical Resistant Gloves Guide

This chemical resistant chart should only be used as a guide only. The chemical resistance of gloves can be affected by concentration, temperature, presence of other chemicals and other factors such as length of time that the glove is in contact with the chemical and thickness of the glove. All safety equipment should be selected in conjunction with an OSHA approved safety program that evaluates your specific hazards. Improper selection and/or use of safety products may cause serious injury.

	NEOPRENE 67	NITRILE 730	PVC 77
Acetaldehyde	E	F	G
Acetic Acid	E	G	E
Acetone	E	F	G
Acetonitrile	E	F	E
Ammonia (gas)	E	E	E
Ammonium Hydroxide	E	E	E
Amyle Acetate	G	E	F
Aniline	G	F	G
Battery Acid	E	E	E
Benzene	G	F	G
Butane	G	E	F
Butyl Acetate	F	F	F
Carbolic Acid	E	F	E
Cabon Disulfide	F	F	F
Caustic Soda	E	E	E
Cellusole Solvent	E	E	F
Chlorine (gas)	E	E	E
Chlorobenzene	P	P	F
Chloroform	F	P	F
Critic Acid	E	E	E
Cutting Oil	E	E	F
Cyclohexane	E	E	G
Diacetone Alcohol	E	E	E
Diesel Fuel	E	E	E
Diethanolamine	E	E	E
Diethyl Ether	E	E	F
Diethylene Oxide	G	F	G
Di-Isobutyl Ketone	E	E	E
Dimethyl Formamide	E	P	F
Divinyl Benzene	F	G	G
Ethanol	E	E	E
Ethyl Acetate	G	F	G
Ethyl Benzene	F	G	G
Ethylene Glycol	E	E	E
Ethylene Oxide (gas)	E	E	E
Formaldehyde	E	E	E
Formic Acid	E	F	E
Freon	E	E	E
Gasoline (unleaded)	E	E	E
Heptane	E	E	E
Hexane	E	E	P
Hydraulic Fluid	E	E	G
Hydrochloric Acid	E	E	E
Hydrogen Chloride (gas)	E	E	E
Hydrogen Fluoride (gas)	E	E	E
Hydrogen Peroxide	E	E	E
Iodomethane	P	F	F
Isobutyl Alcohol	E	E	F
Iso-Octane	E	E	E
Isopropyl Alcohol	E	E	G
Kerosene	E	E	E
Lacquer Thinner	G	G	G
Lactic Acid	E	E	E
Linoleic	E	E	G
Linseed Oil	E	E	E
Methanol	E	E	E
Methyl Acetate	G	F	F
Methylamine	E	E	E
Methyl Chloride (gas)	E	E	E
Methylene Chloride	F	P	F
Methyl Ethyl Ketone	G	P	F
Mineral Oil	E	E	F
Monoethanalamine	E	E	E
Naphtha	E	E	F
Nitric Acid	E	E	E
Nitrobenzene	F	P	P
Oleic Acid	E	E	E
Olive Oil	E	E	E
Pentane	E	E	E
Perchloroethylene	F	G	P
Petroleum Ether	E	E	E
Phenol	E	F	E
Phosphoric Acid	E	E	E
Potassium Hydroxide	E	E	E
Propoxypropanol	E	E	E
Propyl Acetate	G	F	F
Propylene Dichloride	P	F	P
Refrigerant	E	G	G
Rubber Solvent	E	E	E
Sodium Hydroxide	E	E	E
Styrene	F	F	G
Sulfuric Acid	E	E	E
Tannic Acid	E	E	E
Tetrachloroethylene	F	E	F
Toluene	F	F	G
Trichloroethylene	G	G	F
Turbine Oil	E	G	F
Turpentine	E	E	E
Vegetable Oil	E	G	E
Vinyl Chloride (gas)	E	E	E
Wood Preservative	F	E	F
Xylene	P	F	F

KEY: E =Excellent G =Good F =Fair P =Poor

CLEANING/MAINTENANCE

Both new and used gloves should be thoroughly inspected before wearing to ensure no damage is present. After each use, where re-use is intended, contaminated gloves should be cleaned. All gloves should be hand-washed and air-dried.

What is meant by permeation rate, breakthrough time, and degradation?

Permeation rate is the rate at which the chemical will move through the material. It is measured in a laboratory and is expressed in units like milligrams per square meter per second (or some other [weight of chemical] per [unit area of material] per [unit of time]). The higher the permeation rate, the faster the chemical will move through the material.

Permeation is different from penetration. Penetration occurs when the chemical leaks through seams, pinholes and other imperfections in the material: permeation occurs when the chemical diffuses or travels through intact material.

Breakthrough time is time it takes a chemical to permeate completely through the material. It is determined by applying the chemical on the glove exterior and measuring the time it takes to detect the chemical on the inside surface. The sensitivity of the analytical instruments used in these measurements influence when a chemical is first detected. The breakthrough time gives some indication of how long a glove can be used before the chemical will permeate through the material.

Degradation is a measurement of the physical deterioration of the material due to contact with a chemical. The material may get harder, stiffer, more brittle, softer, weaker or may swell. The worst example is that the material may actually dissolve in the chemical.

Cut Resistant Glove Selection

Cut-resistant gloves are designed to protect hands from direct contact with sharp edges such as glass, metal, ceramics and other materials. Cut-resistance is a function of a glove's material composition and thickness. You can increase your cut protection by increasing material weight (i.e. ounces per square yard), using high-performance materials such as Spectra®, Kevlar®, etc., or by using composite yarns made with varying combinations of stainless steel, fiberglass, synthetic yarns and high-performance yarns. Performance characteristics can also be affected by a materials weight and coatings applied to the outside surface. Lighter weight styles are typically more flexible, resulting in less hand fatigue, while their heavier counterparts will generally provide the wearer with more cut and abrasion protection. Coated gloves enhance grip, especially on slippery surfaces. However, some coated gloves may not be appropriate for food handling applications.

- **ATA -** (Advanced Technology Aramid) A high performance fiber that combines several aramids and synthetic materials. It is about 12 times stronger than steel.
- **Dyneema® -** is a superstrong polyethylene fiber that offers maximum strength combined with minimum weight. It is up to 15 times stronger than quality steel and up to 40% stronger than aramid fibers, both on weight for weight basis. Dyneema® floats on water and is extremely durable and resistant to moisture, UV light and chemicals.
- **Fiber-Metal Blends -** many durable, abrasion-resistant gloves are made of a woven fabric blend of Spectra, Kevlar and stainless steel.
- **Hexarmor -** Hexarmor uses SuperFrabric® Brand Technology to create hard plates that are attached to fabrics. Multiple, staggered layers offer the highest levels of needlestick and sharp protection available.
- **Kevlar® Aramid Fiber -** five times stronger than steel per unit weight. Inherently flame resistant it begins to char at 800°F (427°C). The thread made of Kevlar fiber is used to sew seams on temperature-resistant gloves.
- **Leather -** an extremely thick leather glove will provide some degree of cut resistance, pound per pound cotton actually has a greater cut resistance than leather while it is true that leather is superior to cotton and even to Kevlar when it comes to abrasion.
- **Metal Mesh -** interlocked stainless steel mesh offers superior cut and puncture protection due to its strength. Metal Mesh gloves are very cut- and abrasion-resistant and are used often in meat/poultry applications.
- **Spectra Fiber** - Ultrahigh molecular-weight polyethylene fiber that offers high cut-resistance, even when wet. It's 10 times stronger than steel per unit weight.
- **Steel Core** gloves are cut- and abrasion-resistant and are often used for meat/poultry processing, glass handling, metal fabrication, automotive manufacturing as well as being used in the paper industry.
- **SuperFabric® -** Combinations of the number of layers, thickness, substrates, surface coatings, etc., lead to fabrics which have varying levels of puncture, cut and abrasion resistance, grip and flexibility. Tactile surface offers improved grip of wet and oily surfaces.
- **Twaron -** Lightweight para-aramid fiber (poly-paraphenylene terephthalamide) that is 5 times stronger than steel.
- **Vectran:** Gloves made from the Vectran fiber materials are cut- and abrasion-resistant, flexible and offer mid level heat protection. This glove material is often used in the rubber industry as well as plastic manufacturing and metal handling.

Cut Resistant Levels

CUT RESISTANCE ↑

Metal Mesh
Fiber-Metal Blends (Kevlar Steel, Dyneema Fiberglass)
Dyneema
ATA
Spectra
Kevlar
Synthetic Fabrics (Polyester, Nylon)
Cotton
Leather
Latex

How Can Grip Help?

To lift something, you have to grab it and hold on to it so it doesn't drop. The energy required to hold anything is closely related to the friction coefficient. A larger friction coefficient makes it easier to lift things, leaving more energy in reserve for getting the job done.

Grip is indeed the new safety feature. But why is grip able to offer the glove user more safety? Surely gloves have always had grip, so how can this be a new thing?

The point being that gloves can do only part of the job; there must be a holistic approach. Gloves with the appropriate grip have a major impact on the amount of grip force exerted, so it's important to get this right and do your research.

Oily Environment

Weight lifted (kg)	Without glove (kgf)	With standard glove (kgf)	With new glove (kgf)
2	11	8	5
4	18	13	9
6	31	21	15

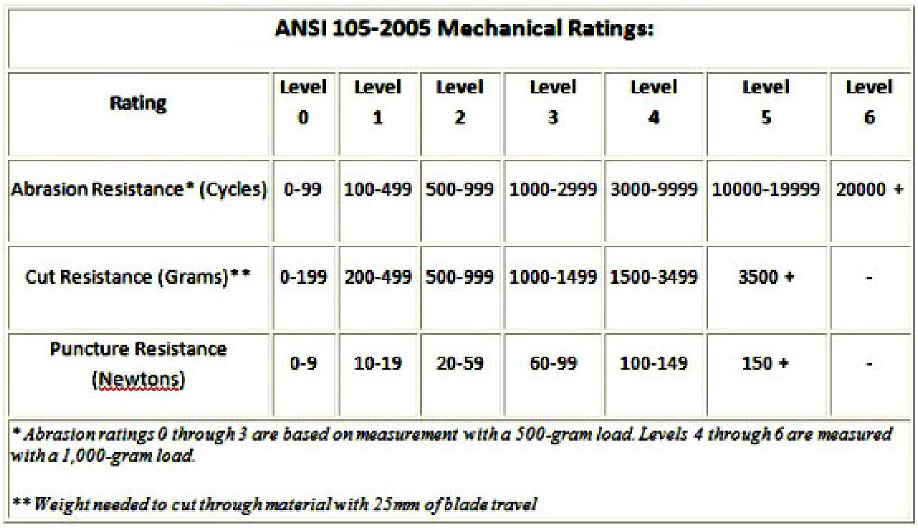
kgf = kilogram force

The new wave of grip products offered by several companies can reduce the amount of force required. The third column in the accompanying table is intended to give an idea of the improvements these new gloves can deliver in oily applications.

Guide to the selection of skin protection:

Hazard	Degree of Hazard	Protective Material
Abrasion	Severe	Reinforced heavy rubber, staple-reinforced heavy leather
	Less Severe	Rubber, plastic, leather, polyester, nylon, cotton
Sharp Edges	Severe	Metal mesh, staple-reinforced heavy leather, Kevlar® aramid-steel mesh
	Less Severe	Leather, terry cloth (aramid fiber)
	Mild with delicate work	Lightweight leather, polyester, nylon, cotton
Chemicals and fluids	Risk varies according to the chemical, its concentration, and time of contact among other factors. Refer to the manufacturer, or product MSDS	**Dependant on chemical**. Examples include: Natural rubber, neoprene, nitrile, butyl, PTFE (polytetrafluoroethylene), Teflon®, Vitom®, polyvinyl chloride, polyvinyl alcohol, Saranex™, 4H®, Chemrel®, Responder®, Trellchem®
Cold		Leather, insulated plastic or rubber, wool, cotton
Heat	High temperatures (over 350°C)	Asbestos
	Medium high (up to 350°C)	Nomex®, Kevlar®, neoprene-coated asbestos, heat-resistant leather with linings
	Warm (up to 200°C)	Nomex®, Kevlar®, heat-resistant leather, terry cloth (aramid fiber)
	Less warm (up to 100°C)	Chrome-tanned leather, terry cloth
General Duty		Cotton, terry cloth, leather
Product Contamination		Thin-film plastic, lightweight leather, cotton, polyester, nylon
Radiation		Lead-lined rubber, plastic or leather

ANSI 105 is another performance test that is often referred to by manufacturers. The chart below shows what this rating is.



ANSI 105-2005 Mechanical Ratings:

Rating	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Abrasion Resistance* (Cycles)	0-99	100-499	500-999	1000-2999	3000-9999	10000-19999	20000 +
Cut Resistance (Grams)**	0-199	200-499	500-999	1000-1499	1500-3499	3500 +	-
Puncture Resistance (Newtons)	0-9	10-19	20-59	60-99	100-149	150 +	-

**Abrasion ratings 0 through 3 are based on measurement with a 500-gram load. Levels 4 through 6 are measured with a 1,000-gram load.*

*** Weight needed to cut through material with 25mm of blade travel*

ANSI 105-2011

American National Standard for Hand Protection Selection Criteria, ANSI 105-2011, is designed to assist users and employers to select appropriate gloves for identifiable workplace hazards that could result in chemical burns, severe cuts and lacerations, and burns caused by heat and flame exposures.

Before publication of the first edition of this standard in 2000, the practice of rating work gloves' protection level as "good, fair or poor" created inconsistencies among glove manufacturers in rating their gloves' ability to provide protection. ANSI 105 provides a consistent, numeric-scale method for manufacturers to rate their products against certain contaminants and exposures. With classification based on this scale, users can make better-informed decisions about which gloves are suitable for which tasks.

Glove performance and pass/fail criteria are included for the following hazardous exposures: cut, puncture and abrasion resistance; chemical permeation and degradation; detection of holes; vibration reduction, and heat and flame resistance. Updates reflected in the 2011 edition focus on distinct test methods to determine a glove's abrasion resistance depending on the material type, and cited test methods to ensure they represent the state of the art in materials performance and technology.

The standard also includes a recommended hand protection selection procedure, and reference information on special considerations such as biological protection, extreme temperature applications, cleanroom applications, hazardous materials response applications, electrical protection and radiation hazards. A section on human factors describes how fit, function and comfort are incorporated into selection.

ANSI 105-2016

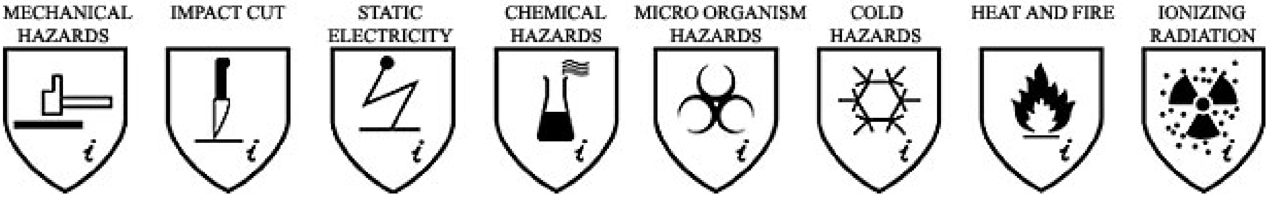
ANSI 105-2016 addresses the classification and testing of hand protection for specific performance properties related to mechanical protection (cut-resistance, puncture resistance and abrasion resistance), chemical protection (permeation resistance, degradation) and other performance characteristics such as ignition resistance and vibration reductions.

Gloves are classified to a performance level ranging from 0 to 6 based upon their performance when evaluated against defined industry test methods. Such ratings can assist users to select appropriate hand protection for known specific hazards in the workplace.

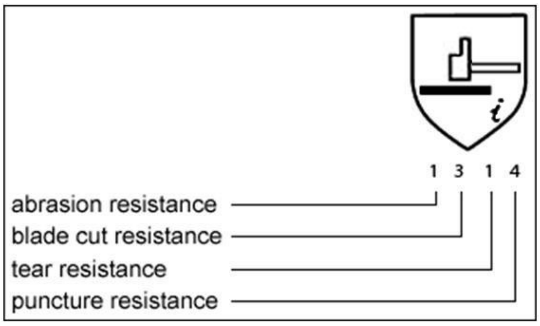
One of the major changes in ANSI/ISEA 105-2016 surrounds the determination of classification for cut-resistance, including the use of a single test method for testing in an effort to provide consistent meaning of the ratings from the end-user perspective. Classification levels have been expanded to address the disparate gap among certain levels seen in earlier versions and to model the approach used in similar international standards.

Additional updates include the incorporation of a needlestick puncture test, recognizing that this is a common potential exposure for the medical, sanitation and recycling industries.

STANDARD SYMBOLS



The pictograms which appear on the gloves represent the hazard which a glove has been tested against.



4-DIGIT NUMBER ON YOUR GLOVES

It's the EN388 rating and it measures abrasion resistance, blade cut resistance, tear resistance and puncture resistance in that order. The performance rating is 1 to 4 with 1 being the lowest and 4 the highest. The blade cut resistance is the only exception; this rating goes up to 5.

The European standard EN388 (which does not apply or affect other regions - it is only provided for reference) is slightly different, offering a matrix based rating system:
First Rating: Abrasion resistance ranges from 0–4 and is based on the number of cycles required to abrade through a sample glove using a specially designed machine for measuring the abrasion of textiles.
Second Rating: Cut resistance ranges from 0–5 and is based on the cut resistance of a rotating circular blade with mass applied to it.
Third Rating: Tear resistance ranges from 0–4 and is the force in Newtons needed to tear a previously cut specimen.
Fourth Rating: Puncture resistance ranges from 0–5 and is the force in Newtons needed to puncture the PPE material using a specially designed stylus.

CE Marking: CE markings are displayed on the glove and indicate compliance with a particular European standard. Part of the CE marking is a pictogram which helps identify the relevant standard(s) met by a specific glove.

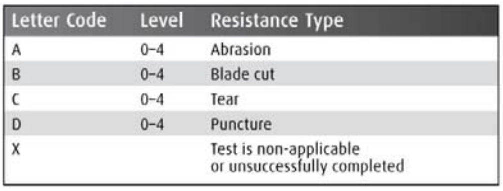
There's the ANSI rating and the EN388 (the European) rating. The European rating usually makes your gloves look better. A glove that would only rate a cut level 2 according to the ANSI rating is a cut level 3 by the EN388 rating.
Here's how the ratings break out

Cut Level	Weight in grams needed to cut with 1" blade travel	
	ANSI	**EN388**
0	<199	<119
1	200-499	120-249
2	500-999	250-499
3	1000-1499	500-999
4	1500-3499	1000-1999
5	>3500	>2000

EUROPEAN STANDARD

Mechanical Hazards EN 388:2003

The EN388 standard test gloves against mechanical hazards including sharp-object handling which could cut, pierce or abrade the skin. The test results indicate the level of glove resistance achieved, a higher number indicating a higher performance rating.



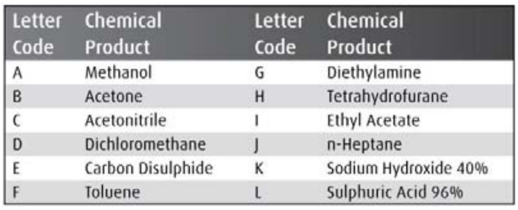
Letter Code	Level	Resistance Type
A	0–4	Abrasion
B	0–4	Blade cut
C	0–4	Tear
D	0–4	Puncture
X		Test is non-applicable or unsuccessfully completed

Chemical Hazards EN 374:2003

Substances that inflame, irritate or burn the skin represent a chemical hazard. Only liquid proof gloves displaying the EN374 symbol offer approved chemical-resistance. It is vitally important that gloves provide sufficient protection against the chemical and applications being used in a particular workplace.

EN374 regulations test gloves for penetration and permeation resistance against chemical and micro-organism hazards. Results are scored 0-6 with a higher numbered result offering more protection.

Approval is obtained if gloves achieve a breakthrough time of at least 30 minutes for at least three of the 12 chemicals categorized within this European standard. Gloves offering protection of less than 30 minutes can be classified as low resistance, marked with a pictogram containing a question mark and excluding capital letters that represent the individual chemical hazards. If you need protection from specific chemicals, choose gloves with the corresponding letters in the pictogram.



Letter Code	Chemical Product	Letter Code	Chemical Product
A	Methanol	G	Diethylamine
B	Acetone	H	Tetrahydrofurane
C	Acetonitrile	I	Ethyl Acetate
D	Dichloromethane	J	n-Heptane
E	Carbon Disulphide	K	Sodium Hydroxide 40%
F	Toluene	L	Sulphuric Acid 96%

EN 374 Micro-organisms

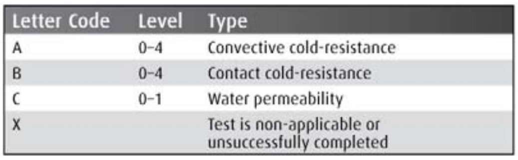
The micro-organism is to be used when the glove conforms to at least a performance level 2 for the penetration test.

EN 374-2 Determination of resistance to water penetration

EN374-2 The low chemical resistance or “waterproof” glove pictogram is to be used for those gloves that do not achieve a breakthrough time of at least 30 minutes against at least three chemicals from the defined list, but which comply with the penetration test.

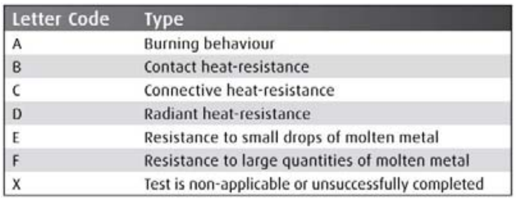
Thermal Hazards EN511:2006, EN407:2004 & EN659:2003

EN511 compliance covers clod working hazards such as frozen gases. Performance levels range from 0-4; the higher the number, the higher the protection offered by the gloves.



Letter Code	Level	Type
A	0–4	Convective cold-resistance
B	0–4	Contact cold-resistance
C	0–1	Water permeability
X		Test is non-applicable or unsuccessfully completed

EN407 compliance offers protection against heat and fire, from sources that include direct contact, radiation, conduction and open flames. Performance levels range from 0-4, higher resistance being offered by higher test-result figures.



Letter Code	Type
A	Burning behaviour
B	Contact heat-resistance
C	Connective heat-resistance
D	Radiant heat-resistance
E	Resistance to small drops of molten metal
F	Resistance to large quantities of molten metal
X	Test is non-applicable or unsuccessfully completed

EN659 defines performance requirements for gloves specifically designed to offer heat and flame protection to firefighters. Additionally, they offer protection against mechanical and chemical hazards so that they are fit for purpose in a wide variety of emergency situations.

Radioactive contamination and ionizing radiation EN421:2010

EN421 compliance covers ionizing radiation and radioactive contamination. It includes protective standard for alpha-beta-gamma and x-rays or neutron radiations, as well as offering protection to those handling radioactive substances in their workplace. Lead is used in gloves offering protection against radiation risk.

Electrical Hazards EN60903:2003

EN60903 compliance is required for electrician's gloves, which are made from insulating material suitable for handling live wires. There are six types of glove that fall into this category, tested against the relevant voltage present in the workplace.

GLOVE CLASS	VOLTAGE
00	500
0	1000
1	7500
2	17000
3	26500
4	36000

References:

Occupational Safety and Health Administration https://www.osha.gov
American National Standards Institute https://www.ansi.org
The Safety Equipment Institute http://www.seinet.org
International Safety Equipment Association https://safetyequipment.org
European Committee for Standardization https://www.cen.eu
The European Union https://europa.eu
The British Standards Institution https://www.bsigroup.com