Hand Protection

GLOVES SELECTION CHART

1. Physical Resistance
2. Chemical Resistance
3. Application

2

Check Chemical Classification & Hazards Refer to MSDS

Use Chemical Resistance Chart

Determine Level of Protection
1. Physical Condition
2. Chemical Condition

Select Material of Glove Refer to Material Chart

3

3

Consider features for application: grip, length, dexterity, comfort, insulation, type of cuff

Balance between features for application. Thinner-gauge: extra dexterity & tactility. Heavier-gauge: greater protection and wear. Flock-lined for extra comfort, insulation and wear. Supported for added cut, snag, puncture or abrasion resistance.

Determine finish & grip for your application: rough, smooth, wrinkle, embossed or bisque, etc.

Select glove length: Immersed depth? Splash?

Select size for right fit, dexterity & comfort

Select colour for contamination identification or work area designation

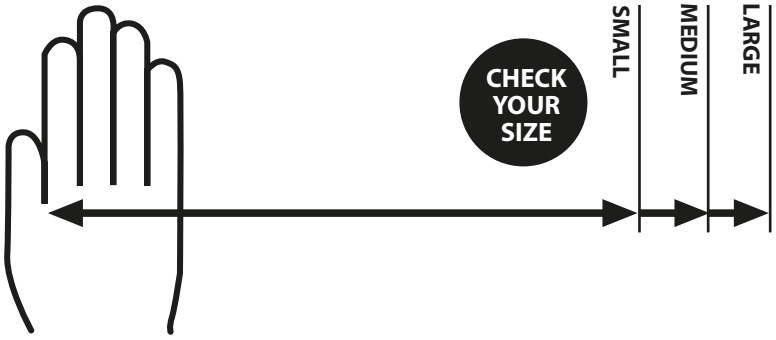
1

Physical Resistance: Abrasion, Cut, Puncture Temperature

Select material of glove needed Refer to Material Chart

For product protection: toughness, fit, thickness & temperature or disposability

3



OVERVIEW OF GLOVE MATERIALS

Ideally, the perfect glove should be made of materials that resist all chemicals, provide excellent tactile sensitivity, protect against all physical hazards and are durable. In practice, this is not possible as each material's characteristics react differently to certain working conditions.

OVERVIEW OF SPECIAL GLOVE MATERIALS

Butyl	Viton	Polyurethane	PVA	Chlorosulphonated Polyethylene (CSM)
Superior resistance to highly corrosive acids. Excellent for ketones and esters, good resistance to bases, alcohol, amines and amides, glycol ethers, nitro-compounds and aldehydes	Most chemical-resistant of all rubbers against toxic and highly permeating chemicals, eg. PBCs, benzene, aniline and most solvents	Superior resistance against ketonic, organic and aromatic compounds. Good for most solvents like toluene, methanol gasoline, acetone, MEK, etc	Superior against most strong solvents like aromatics, aliphatics and chlorinated solvents	Excellent resistance against strong acids and alkalis
Not good for hydrocarbons	Minimal resistance to cuts and abrasions	Not good for OME, phenol, THF, acids and alkalis	Not good for water-based solutions	Does not perform well in organic and aromatic solvents

PHYSICAL RESISTANCE CHART

Material	Abrasion Resistance	Cut Resistance	Flexibilty	Heat Resistance	Ozone Resistance	Puncture Resistance	Tear Resistance
Butyl Rubber (Butyl)	F	G	G	E	E	G	G
Chlorinated Polyethylene (CPE)	E	G	G	G	E	G	G
Natural Rubber	E	E	E	F	P	E	E
Nitrile-Butadiene Rubber (NBR)	E	E	E	G	F	E	G
Neoprene	E	E	G	G	E	G	G
Nitrile Rubber (Nitrile)	E	E	E	G	F	E	G
Nitrile Rubber + Polyvinyl Chloride (Nitrile + PVC)	G	G	G	F	E	G	G
Polyethylene	F	F	G	F	F	P	F
Polyurethane	E	G	E	G	G	G	G
Polyvinyl Alcohol (PVA)	F	F	P	G	E	F	G
Polyvinyl Chloride (PVC)	G	P	F	P	E	G	G
Styrene-Butadience Rubber (SBR)	E	G	G	G	F	F	F
Viton	G	G	G	G	E	G	G
RATING KEY:	E = EXCELLENT		G = GOOD		F = FAIR	P = POOR	

Note: Rating are subject to variation depending on formulation, thickness and whether material is supported by fabric.

CHEMICAL RESISTANCE CHART

The chart on the following page shows the degradation of the gloves. Degradation is the reduction in one or more of the physical properties of the material due to chemical contact. Exposed gloves may swell, get harder or softer, stiffen or weaken or become brittle. Degradation-resistance testing of gloves and permeation-resistance testing are essential. Data shown are the result of laboratory tests and are intended to serve only as a guide. No performance warranty is intended or implied.

DEGRADATION RESISTANCE CHART

Chemical	Natural Rubber	Neoprene	Nitrile	Vinyl
Acetaldehyde	G	G	E	G
Acetic acid	E	E	E	E
Acetone	G	G	G	F
Acrylonitrile	P	G	-	F
Ammonium hydroxide (conc.)	G	E	E	E
Aniline	F	G	E	F
Benzaldehyde	F	F	E	G
Benzene	P	F	G	F
Benzyl Chloride (a)	F	P	G	P
Bromine	G	G	-	G
Butane	P	E	-	P
Butyraldehyde	P	G	-	G
Calcium hypochlorite	P	G	G	G
Carbon disulfide	P	P	G	F
Carbon tetrachloride	P	F	G	F
Chlorine	G	G	-	G
Chloroacetone	F	E	-	P
Chloroform (a)	P	F	G	P
Chromic acid	P	F	F	E
Cyclohexane	F	E	-	P
Dibenzyl ether	F	G	-	P
Dibutyl phthalate	F	G	-	P
Diethanolamine	F	E	-	E
Diethyl ether	F	G	E	P
Dimethyl Sulfoxide (b)	-	-	-	-
Ethyl acetate	F	G	G	F
Ethylene dichloride (a)	P	F	G	P
Ethylene glycol	G	G	E	E
Ethylene trichloride (a)	P	P	-	P
Fluorine	G	G	-	G
Formaldehyde	G	E	E	E
Formic acid	G	E	E	E
Glycerol	G	G	E	E
Hexane	P	E	-	P
Hydrobromic acid (40%)	G	E	-	E
Hydrochloric acid (conc.)	G	G	G	E
Hydrofluoric acid (30%)	G	G	G	E
Hydrogen peroxide	G	G	G	E
Iodine	G	G	-	G
Methylamine	G	G	E	E
Methyl cellosolve	F	E	-	P
Methyl chloride (a)	P	E	-	P
Methylene chloride (a)	F	F	G	F
Methyl ethyl ketone	F	G	G	P
Monoethanolamine	F	E	-	E
Morpholine	F	E	-	E
Naphthalene (a)	G	G	E	G
Nitric acid (conc.)	P	P	P	G
Perchloric acid	F	G	F	E
Phenol	G	E	-	E
Phosphoric acid	G	E	-	E
Potassium hydroxide (sat.)	G	G	G	E
Propylene dichloride	P	F	-	P
Sodium hydroxide	G	G	G	E
Sodium hypochlorite	G	P	F	G
Sulfuric acid (conc.)	G	G	F	G
Toluene (a)	P	F	G	F
Trichloroethylene (a)	P	F	G	F
Tricresyl phosphate	P	F	-	F
Triethanolamine	F	E	E	E
Trinitrotoluene	P	E	-	P

RATING KEY: E = EXCELLENT G = GOOD F = FAIR P = POOR

(a) Aromatic and halogenated hydrocarbons will attack all types of natural and synthetic glove materials. Should swelling occur, the user should change to fresh gloves and allow the swollen gloves to dry and return to normal.

(b) No data on the resistance to dimethyl sulfoxide of natural rubber, neoprene, nitrile rubber, or vinyl materials are available; the manufacturer of the substance recommends the use of butyl rubber gloves.

hand protection

Within the European Union (EU), all PPE must comply with the essential requirements of the PPE 89/686/eec directive.

Category I
Simple: Items for protection against minimal-risk hazards, which can be easily identified by the user. The product and/or packaging must include the appropriate technical files and user information but do not contain pictogram labeling.

Category II
Intermediate: Items that are neither simple nor complex. In addition to the requirements of Category I, Category II gloves undergo independent testing, usually to a European standard. The product and/or packaging must incorporate the appropriate technical files, user information and pictogram labeling on the glove.

Category III
Complex: Items that offer protection against life-threatening hazards. In addition to the requirements of Category II, Category III products must be produced under an independently verified quality system or be subjected to periodic batch testing. The product and/or packaging must include the appropriate technical files, user information and pictogram labeling on the glove.

EUROPEAN STANDARDS (EN'S)

All gloves must satisfy the EN 420 General Requirements for gloves. These are the other specific standards:

MECHANICAL HAZARDS EN 388

PERFORMANCE LEVELS*

0 to 4 0 to 5 0 to 4 0 to 4
- 4: Puncture resistance
- 3: Tear resistance
- 2: Blade cut resistance
- 1: Abrasion resistance

COLD HAZARDS EN 511

PERFORMANCE LEVELS*

0 to 4 0 to 4 0 or 1
- 1: Water permeability
- 2: Contact cold resistance
- 3: Convective cold resistance

RADIOACTIVE CONTAMINATION EN 421

INFORMATION NOTICE

CUTS AND STABS BY HAND KNIVES EN 1082-1

MICRO-ORGANISMS EN 374-2

GENERAL CHEMICAL PROTECTION EN 374-3

SPECIFIC CHEMICAL PROTECTION[a] EN 374-3

Letter code	Chemical product
A	Methanol
B	Acetone
C	Acetonitrile
D	Dichloromethane
E	Carbon disulphide
F	Toluene
G	Diethylamine
H	Tetrahydrofurane
I	Ethyl acetate
J	n-Heptane
K	Sodium hydroxide 40%
L	Sulphuric acid 96%

[a] The glove must be tested to a minimum of 3 specific chemicals with a penetration level 2 (>30min) and waterproof.

HEAT AND FIRE EN 407

PERFORMANCE LEVELS*

0 to 4 0 to 4 0 to 4 0 to 4 0 to 4 0 to 4
- 4: Resistance to large quantities of molten metal
- 3: Resistance to small drops of molten metal
- 2: Radiant heat resistant
- 1: Convective heat resistance
- Contact heat resistance
- Burning behaviour

EN 60903

XY ELECTRICAL RISKS

SELECTION REFERENCE:

Class (X)	Tested at voltage:	Approved for work under voltage:
00	2,500	500
0	5,000	1,000
1	10,000	7,000
2	20,000	17,000
3	30,000	26,500
4	40,000	36,000

Category (Y)	Additional Requirement
A	acid resistance
H	oil resistance
Z	ozone resistance
M	resistance against high mechanical strain
R	resistance against acid, oil, ozone and high mechanical strain
C	resistance against extreme cold

* Level X: the test is not applicable or the glove is not tested.

GLOVE SELECTION

Selecting the Proper Gloves
When you're selecting the right glove, you need to look for:
- THE RIGHT GLOVE! - PROTECTION
- A GOOD FIT - DEXTERITY
- QUALITY ASSURANCE - PERFORMANCE

Select the right glove by knowing the hazards your hands face at work. Have your hands enjoy more flexibility and comfort. Having the right fit allows you to perform better!

For instance, if you're directly handling hot sheets of metal, you've got to know how hot the metal is. Only then, will it be easy to decide between a 400°F glove or a pair made for higher temperatures. As for chemical-resistant gloves, you've got to know the kinds of chemicals you're dealing with, and at what concentrations. There are various materials used to make the gloves we sell, and each has its own pros and cons.

Applications
Contamination Protection - It's disposable! Allows for easy, mess-free cleanup, and prevents transfer of bacteria and viruses! The gloves are great for clinical purposes, inspections and food preparation. It's convenient! But there's limited protection against liquids, oils, chemicals and minor injuries like cuts and abrasions.

Chemical Resistance* - Chemical-resistant gloves - depends on what they are made of. These gloves offer many types of protection against hazardous chemicals. Chemical-resistant gloves are waterproof! So they protect against penetration of liquids. Many chemical-resistant gloves can also prevent abrasions, cuts, punctures and snags. Of course, their range of applications vary, depending on material used.

* Note that chemical-resistant gloves are not universally resistant to all chemicals. Different types of chemical-resistant gloves are manufactured from different materials, and hence, are resistant to specific types of chemicals and their concentrations.

General Mechanical Protection - General-purpose gloves protect against various physical injuries such as cuts and abrasions, depending on the construction of the glove. It doesn't protect against liquids.

Cut Resistance - Cut-resistant gloves prevent cuts and puncture wounds when handling sharp objects like blades, broken glass and metal objects with sharp edges.

Glove Materials
Natural Rubber - Also called latex - is snag, puncture, abrasion and cut-resistant. They are comfortable and don't restrict movement. The gloves also protect against harsh detergents. Compared with Nitrile or Neoprene, Latex is the more affordable choice. However, some people might be allergic to latex. And it is weak in handling animal fat, oils and solvents, which cause the rubber to swell and degrade.

Nitrile - It's the solution to replacing latex, PVC or neoprene gloves. Nitrile protects against acids, bases, oils, solvents, esters, grease and animal fat. It is more resistant to snags, punctures, abrasions and cuts. And it's great on sensitive skin. Nitrile is versatile and is commonly used in many industries like laboratories, chemical and food processing and many other applications.

Neoprene - a versatile general-purpose synthetic rubber with 70 years of proven performance in almost every industry. Neoprene protects you against acids, alcohols, oils, solvents, esters, grease and animal fat. These gloves do a fine job in resisting snags, punctures, abrasions and cuts. It is also great on sensitive skin! Neoprene is chemical-resistant, and withstands temperature fluctuations.

PVC - Polyvinyl chloride or vinyl gloves are resistant to most types of fat, oils, acids, caustics, petroleum hydrocarbons, alcohol, and glycol ethers but not aromatics, aldehydes or ketones. Vinyl comes highly recommended for citric acid (10% concentration), cyclohexane, ethylene glycol, formaldehyde, formic acid, glycerine, hydrochloric acid (linseed oil, perchloric acid, potassium hydroxide, and tannic acid). Vinyl gloves are excellent for abrasion resistance. It's ideal for protecting you in petrochemical, construction and industrial applications.

Polyester/Cotton - Poly-cotton blends are great. The cotton provides softness and wicks sweat from your hands while the polyester prevents shrinking. Poly-cotton blends are commonly used in string-knit gloves because they are comfortable and hardy. And they're easily washable!

Leather - Made from the skins of animals like cows, goats, pigs and deer. The animal hides are tanned with chrome sulfate, bichromate of potash, tannic acid and colouring agents. Leather gloves are thick, and they are hardy. Besides protecting you from abrasions, leather gloves are flexible and breathable.

LATEX ALLERGIES*

What are the types of allergies to latex?
The most severe and rare form of latex allergy is Type I hypersensitivity, which can cause anaphylactic shock, an immediate and potentially fatal reaction. Anaphylactic shock can be provoked in people who are allergic to latex by previous usage of latex in the vicinity. As latex is typically powdered during manufacture, latex proteins present within the latex gloves tend to attach themselves to the powder on the glove. As wearers don and use these gloves, the latex proteins are dispersed into the air along with the powder. When these contaminated powder particles are inhaled by allergic people, a serious reaction might ensue.

The other reaction is a Type IV allergy, or allergic contact dermatitis, in which an allergic person would develop a delayed skin rash with blistering. The less severe irritant contact dermatitis causes dry, itchy, irritated areas on the skin, often on the hands. The irritated areas increase risk of acquiring infections and transmitting them.

People who are at risk of developing allergy to latex:
- Healthcare workers or users with repeated exposure to latex gloves or latex materials
- People who have had multiple surgical procedures
- People with a defect in their bone marrow cells
- Patients who require regular or continuous urinary catheters with a rubber tip
- Spinal surgery patients
- People with eczema
- People suffering from asthma
- People with allergies
- Employees who work distributing or delivering latex products
- People who work in car-tire factories
- Condom users

See a doctor if you suspect you might have a latex allergy
A standard allergy patch test, or a blood test may be ordered to find out if you have an allergy to latex.

Preventive measures
The most effective way to treat latex allergies is to avoid products containing latex. Using powder-free latex gloves will prevent any airborne latex proteins. So if you have latex allergies, use synthetic rubber gloves like nitrile or neoprene gloves. You might wish to recommend that your workplace management switch the hand protection choice to synthetic rubbers.

*The above is adapted from:
Nordqvist, Christian. "What Is A Latex Allergy? What Causes A Latex Allergy?." Medical News Today. MediLexicon, Intl., 27 Jun. 2012. Web. 28 Oct. 2013. <http://www.medicalnewstoday.com/articles/247168>