

North Chemical Resistance Guide for Silver Shield Gloves

This Chemical Resistance Guide incorporates three types of information. First, the guide indicates breakthrough time and permeation rate. Breakthrough time is defined as the elapsed time between initial contact of the liquid chemical with the outside surface of the glove and the time at which the chemical can be detected at the inside surface of the glove by means of analytical equipment. **WHEN BREAKTHROUGH OCCURS, THE GLOVE IS NO LONGER PROVIDING TOTAL PROTECTION.** Permeation rate, measured in milligrams per square meter per second (mg/m²/sec) is the measured steady state flow of the permeating chemical through the glove elastomer. Glove thickness plays an important role in resistance to permeation.

Secondly, this guide indicates degradation resistance. Degradation is a deleterious change in one or more of the glove's physical properties. The most obvious forms of degradation are the loss of the glove's strength and excessive swelling. Several published degradation lists (primarily "The General Chemical Resistance of Various Elastomers" by the Los Angeles Rubber Group, Inc.) were used to determine degradation.

The third item of information provided by this chart is the code that gives the user a general recommendation on which gloves should be evaluated and tested first. The code incorporates data from other sources.

The permeation data in this guide are based on permeation tests performed in accordance with ASTM Standard F 739 under laboratory conditions by North Hand Protection or an independent AIHA accredited laboratory. Neither North Hand Protection nor the independent laboratory assumes any responsibility for the suitability of an end user's selection of gloves based on this guide.

Data on chemicals not listed here can be obtained by calling the North Hand Protection Customer Service Department at (803) 745-5900 or your North Hand Protection Territory Manager.

User Precautions

Protective gloves and other protective apparel selection must be based on the user's assessment of the workplace hazards. Apparel materials do not provide unlimited protection against all chemicals, and the user must

determine *before* use that the apparel will resist permeation and degradation by the chemicals (including chemical mixtures) in the environment of intended use.

To obtain maximum life, protective gloves and other protective apparel should have chemicals removed from the surface by washing or other appropriate methods after each use. The apparel should be stored away from the contaminating atmosphere.

Punctured, torn or otherwise ruptured apparel must be removed from service; unserviceable apparel may be disposed of only in accordance with applicable waste disposal regulations.

Key to Degradation and Permeation Ratings

- E** Excellent.....Fluid has no effect
- G** GoodFluid has minor effect
- F** FairFluid has moderate effect
- P** PoorFluid has severe effect, ranging from moderate to complete destruction
- ND**None detected
- ID**Insufficient data, data not available or conflicting data

Physical Performance Chart

Physical Characteristics	Silver Shield®	Viton*	Butyl	Nitrile
Abrasion Resistance	F	G	G	E
Cut Resistance	P	G	G	E
Puncture (Snag) Resistance	F	G	G	E
Flexibility	E	G	G	E
Heat Resistance	F	G	G	G
Ozone Resistance	E	E	G	F
Tensile Strength	E	G	G	E
Low Gas Permeability	E	E	E	P

Note: Products in these categories vary in capabilities. Laboratory tests are necessary for specific recommendations.

*Viton is a Registered Trademark of Du Pont Company.

Chemical	D	BT	PR	PK	Chemical	D	BT	PR	PK	Chemical	D	BT	PR	PK
Acetaldehyde	E	>6 hrs	ND	***	Dimethyl Formamide	E	>8 hrs	ND	***	Morpholine	E	>8 hrs	ND	***
Acetone	E	>6 hrs	ND	***	Dimethylsulfoxide	G	ID	ID	***	Nitric Acid (3 Molar)	E	>6 hrs	ND	***
Acetonitrile	E	>8 hrs	ND	***	Dioxane	E	>8 hrs	ND	***	Nitrobenzene	E	>8 hrs	ND	***
Acrylic Acid	ID	ID	ID	***	Divinyl Benzene	E	>8 hrs	ND	***	Nitropropane	E	>8 hrs	ND	***
Acrylonitrile	E	ID	ID	***	Epichlorohydrin	ID	ID	ID	***	Oxalic Acid	E	>8 hrs	ND	***
Aldehyde	E	>6 hrs	ND	***	Ether	ID	>6 hrs	ND	***	PCB (Aroclor 1254 (50%))	E	>8 hrs	ND	***
Aniline	E	>8 hrs	ND	***	Ethyl Acetate	E	>6 hrs	ND	***	Pentachlorophenol (1% in kerosene)	E	>8 hrs	ND	***
Benzaldehyde	ID	ID	ID	***	Ethyl Ether	ID	>6 hrs	ND	***	n-Pentane	E	>6 hrs	ND	***
Benzene	E	>8 hrs	ND	***	Ethylamine (70% in water)	E	47 min	7.64	*	Perchloroethylene	E	>6 hrs	ND	***
Benzoyl Chloride	ID	ID	ID	**	Ethylene Dibromide	E	ID	ID	***	Phenol (85% in water)	G	>6 hrs	ND	***
Bromobenzene	E	ID	ID	***	Formaldehyde	E	>6 hrs	ND	***	Propyl Acetate	E	>6 hrs	ND	***
Butyl Acetate	E	>6 hrs	ND	***	Furan	ID	ID	ID	**	n-Propyl Acetate	ID	>6 hrs	ND	***
p-t Butyltoluene	E	>8 hrs	ND	***	Furfural	E	>8 hrs	ND	***	Propylenediamine	ID	ID	ID	**
Butyraldehyde	E	ID	ID	***	Glutaraldehyde	E	ID	ID	***	Pyridine	ID	ID	ID	**
Carbon Disulfide	G	>8 hrs	ND	***	n-Hexane	E	>6 hrs	ND	***	Red Fuming Nitric Acid	P	35 min	ID	*
Carbon Tetrachloride	E	>6 hrs	ND	***	Hydrazine (70% in water)	G	>6 hrs	ND	***	Sodium Hydroxide 50%	E	>6 hrs	ND	***
Cellosolve	G	>6 hrs	ND	***	Hydrochloric Acid (37%)	E	>6 hrs	ND	***	Styrene	G	>4 hrs	ND	**
Chlorobenzene	E	ID	ID	***	Hydrofluoric Acid (50%)	G	>6 hrs	ND	***	Sulfuric Acid (3 Molar)	E	>6 hrs	ND	***
Chloroform	P	10 min	0.009	*	Isobutyl Alcohol	E	ID	ID	***	Tetrachloroethylene	E	>6 hrs	ND	***
Chloronaphthalene	E	>8 hrs	ND	***	Isobutyraldehyde	E	ID	ID	***	Tetraethylenepentamine	ID	ID	ID	**
Chloroprene	ID	ID	ID	***	Methacrylic Acid	ID	ID	ID	***	Tetrafluoroethylene	E	ID	ID	***
Cyclohexane	E	>6 hrs	ND	***	Methacrylonitrile	E	ID	ID	***	Tetrahydrofuran	E	>8 hrs	ND	***
Cyclohexanol	E	>6 hrs	ND	***	Methyl Chloroform	ID	>6 hrs	ND	***	Thiophene	ID	ID	ID	**
Cyclohexanone	E	>6 hrs	ND	***	Methyl Cyanide	ID	>8 hrs	ND	***	Toluene	E	>6 hrs	ND	***
Dibutylphthalate	E	>6 hrs	ND	***	Methyl Ethyl Ketone	E	>24 hrs	ND	***	Toluene Diisocyanate	E	>8 hrs	ND	***
1,1, Dichloroethane	ID	2.4 hrs	6	**	Methyl Isocyanate	ID	ID	ID	***	Trichloroethylene	E	>6 hrs	ND	***
1,2, Dichloroethane	E	>6 hrs	ND	***	Methylamine (40% in water)	F	1.9 hrs	2.0	**	1,1,1 Trichloroethane	E	>6 hrs	ND	***
Diethylamine	E	>8 hrs	ND	***	Methylene Chloride	G	>8 hrs	ND	***	1,1,2, Trichloroethane	ID	ID	ID	**
Diethylaminoethanol	E	ID	ID	***	Methylene Dianiline	E	>24 hrs	ND	***	Triethylamine	ID	ID	ID	**
1,4-Diethylene Dioxide	ID	>8 hrs	ND	***	Monoisopropylamine	ID	ID	ID	***	Vinyl Chloride	E	>8 hrs	ND	***
Diethylenetriamine	ID	ID	ID	**						Xylene	E	>24	ND	***

**D = Degradation, BT = Breakthrough Time, PR = Permeation Rate, ND = None Detected, ID = Insufficient Data
PK (Permeation Key) *** = Good for Total Immersion, ** = Good for Accidental Splash/Intermittent Exposure, * = Not Recommended**