Chemical Hand Protection Selection Matrix

Chemical Protective Glove Selection

Matrix Instructions and Guidance

1. **The matrix contains hand protection recommendations intended to protect the user from harmful chemical exposures and was developed using data in the Naval Ship's Technical Manual (NSTM) 670, Volume 2.**
2. **Volume 2 of NSTM 670 incorporates the Hazardous Material User's Guide (HMUG) and contains guidance for various chemical groups and PPE (hand, eye, face, foot, body, etc.) recommended for each.**
3. **This matrix is intended to supplement the HMUG and chemical product Safety Data Sheet (SDS) not to replace them. Always fully review the HMUG and MSDS/SDS.**
4. **This matrix contains links which will lead the user to additional information such as photos of hand PPE, National Stock Number (NSN), and NAVSEA Standard PMS Item Name (SPIN) information.**

Color-Coding Legend

Glove meets the recommendation of the NSTM 670 (Volume II) Hazardous Material User's Guide
Glove is acceptable for use under certain conditions listed in the block
Glove is not recommended for protection against chemicals in that particular group
Additional information on proper glove selection is available by clicking on "More Info"

General Notes and Recommendations

Different glove materials provide varying levels of protection from specific chemicals. It's essential to choose the right glove material in order to be properly protected.

Users can click on the "More Info" link to assist them in determining which glove material is most protective against many specific chemicals.

Thin nitrile (disposable) gloves provide chemical protection from several types of chemicals. They are generally only 4 or 8 mils (thousands of an inch) thick and may be double-gloved for the best protection.

It is very important to thoroughly wash non-disposable (reusable) gloves after maintenance and before storage to prevent degradation of the glove material.

Glove degradation is occuring when a glove is discolored, gummy and/or sticky, small holes or blisters, or has changes in texture. Immediately replace gloves if these conditions are identified.

Most PPE covered in the matrix have a NAVSEA Standard PMS Item Name (SPIN) number. The SPIN is a unique identifier used to ensure that the proper piece of equipment is being used for shipboard maintenance. Review the product's SDS and container label to determine specific chemicals that comprise the product and recommended protective measures before using the material.

Always verify alternate glove or other PPE selected using this matrix with your command Safety Officer or Medical Department Representative (MDR) in accordance with NSTM 670 and OPNAVINST 5100.19 series.

Chemical Hand Protection Selection Matrix

NSTM 670 (Vol. 2) HMUG Chemical Group #	NSTM 670 (Vol. 2) HMUG Chemical Group Name	NSTM 670 (Vol. 2) HMUG Hand Protection (Chemical) Recommendation (See Note 1 below)	Nitrile (Green "OTTO Fuel") Gauntlet Gloves	Neoprene Gloves	Butyl (Synthetic) Rubber "Toxicological Agents Protective" Gloves	PVC Coated Rubber (Chemical/Oil Protective) Gloves	Black Natural Latex Rubber "Industrial" Gloves	8-mil Disposable Nitrile Gloves	4-mil Disposable Nitrile Gloves	Multi-Layer Laminate Gloves
			SPIN: 02086	SPIN: 19971 (Various)	SPIN: 02085	SPIN: 00517	SPIN: 00525	SPIN: 02826 (8 mil thick)	SPIN: 17934 (4 mil thick)	SPIN: 19972 (A-E) for Silver Shield SPIN: 19972 (F-J) for Barrier Glove
Protection offered by each glove type varies depending on the specific chemical used. Click on the "More Info" icons to review the best option for your specific needs.								NOTE: Incidental (Splash) contact only Replace with new glove if contamination occurs		NOTE: Recommend wearing with a disposable nitrile glove over-layer
Group 1	Acids	Acid-Resistant	More Info	More Info	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 2	Alkalies/Bases/Caustics	Rubber	More Info	More Info	Y	Y	Y	More Info	More Info	Ok (for all)
Group 3	Detergents/Soaps	Rubber	Y	Y	Y	Y	Y	Y	Y	Ok (for all)
Group 4	Photographic Chemicals	Rubber	More Info	More Info	Y	Y	Y	More Info	More Info	Ok (for all)
Group 5	Adhesives	Neoprene or Rubber	More Info	Y	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 6	Cleaning Compounds	Rubber	Y	Y	Y	Y	Y	Y	Y	Ok (for all)
Group 7	Aerosols	Neoprene	More Info	Y	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 8	Paint Materials (Oil-Based)	Neoprene for Oil-Based Paints Any Protective Glove for Water-Based	More Info	Y	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 9	Solvents	Solvent-Resistant	More Info	More Info	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 10	Fuels	Neoprene, Nitrile, or Natural Rubber	Y	Y	More Info	Y	More Info	Y	Y	Ok (for all)
Group 11	Lubricants/Oils	Oil-Proof Neoprene or Rubber	More Info	Y	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 12	Hydraulic Fluids	Neoprene for Petroleum-Based Fluids Butyl Rubber for Synthetic, Fire Resistant Fluids	More Info	OK (Petroleum-Based Fluids)	OK (Fire-resistant Fluids)	N	More Info	More Info	More Info	Ok (for all)
Group 13	Greases	Protective Gloves	Y	Y	Y	Y	Y	Y	Y	Ok (for all)
Group 14	Polish/Wax Compounds	Protective Gloves	Y	Y	Y	Y	Y	Y	Y	Ok (for all)
Group 15	Corrosion Preventive Compounds	Rubber	More Info	More Info	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 16	Antifreeze	Chemical Resistant Neoprene, Natural Latex, or Butyl Rubber	More Info	Y	Y	N	Y	More Info	More Info	Ok (for all)
Group 17	Compressed Gases	None	Consult MSDS for proper PPE, if applicable							
Group 18	Oxidizers	Neoprene	More Info	Y	More Info	N	More Info	More Info	More Info	Ok (for all)
Group 19	Fluorescent Lamps	Protective Gloves	Y	Y	Y	Y	Y	Y	Y	Ok (for all)
Group 20	Heavy Metals	Protective Gloves	Y	Y	Y	Y	Y	Y	Y	Ok (for all)

Note 1: In some cases, the HMUG gives only one or two specific glove recommendations. The "More Info" icons in this matrix are designed to allow the user greater flexibility in choosing the appropriate protective gloves .

Always review the Safety Data Sheet (SDS) and/or product label to determine which chemical components are in the product.

Glove is recommended by NSTM 670 (Vol. 2) HMUG

Glove is acceptable under certain conditions listed in the block

Glove is not recommended for protection against chemicals in this group

Additional information on proper glove selection is available

Back to the "How to Use This Matrix" Page

Additional Notes

Different glove materials provide varying levels of protection from specific chemicals. It's essential to choose the right glove material in order to be properly protected.

Thin nitrile (disposable) gloves provide chemical protection from several types of chemicals. However, they are generally only between 4-8 mils (thousands of an inch) thick and should be double-gloved for the best protection.

It is very important to thoroughly wash non-disposable gloves after maintenance to prevent degradation of the glove material.

Glove dedgradation is occuring when a glove becomes discolored, gummy/sticky, or has changes in texture. Immediately replace gloves if these conditions are identified.

Chemical Hand Protection Selection Matrix

Chemical (Click here to go back to Glove Selection Matrix page)	Chemical Protection Offered by Various Glove Materials*					
	Neoprene	Natural Latex/Rubber	Butyl	Nitrile	Multi-Layer (5 Layer) Laminate** (Silver Shield)	Multi-Layer (5 Layer) Laminate*** (Barrier Glove)
Acetaldehyde	Very Good	Good	Very Good	Good	Excellent	Excellent
Acetic Acid	Very Good	Good	Very Good	Good	Excellent	Very Good
Acetone	Good	Very Good	Very Good	Poor	Excellent	Excellent
Ammonium Hydroxide	Very Good	Very Good	Very Good	Very Good	Excellent	Fair
Amyl Acetate	Fair	Poor	Fair	Poor	Not Tested	Excellent
Aniline	Good	Fair	Fair	Poor	Excellent	Excellent
Benzaldehyde	Fair	Fair	Good	Good	Excellent	Excellent
Benzene	Poor	Poor	Poor	Fair	Excellent	Excellent
Butyl Acetate	Good	Fair	Fair	Poor	Excellent	Excellent
Butyl Alcohol	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Carbon Disulfide	Fair	Fair	Fair	Fair	Excellent	Excellent
Carbon Tetrachloride	Fair	Poor	Poor	Good	Excellent	Not Tested
Castor Oil	Fair	Poor	Fair	Very Good	Not Tested	Not Tested
Chlorobenzene (Dichlorobenzene)	Fair	Poor	Fair	Poor	Excellent	Excellent
Chloroform	Good	Poor	Poor	Fair	Excellent	Fair
Chloronapthalene	Fair	Poor	Fair	Fair	Not Tested	Excellent
Chromic Acid (50% strength)	Fair	Poor	Fair	Fair	Excellent	Not Tested
Citric Acid (10% strength)	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Cyclohexanol	Good	Fair	Good	Very Good	Excellent	Excellent
Dibutyl Phtalate	Good	Poor	Good	Good	Excellent	Not Tested
Diesel Fuel	Good	Poor	Poor	Very Good	Not Tested	Not Tested
Diisobutyl Ketone	Poor	Fair	Good	Poor	Excellent	Excellent
Dimethylformamide	Fair	Fair	Good	Good	Excellent	Excellent
Dioctyl Phtalate	Good	Poor	Fair	Very Good	Excellent	Excellent
Dioxane	Very Good	Good	Good	Good	Excellent	Excellent
Epoxy resins, dry	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Ethyl acetate	Good	Fair	Good	Fair	Excellent	Excellent
Ethyl alcohol	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Ethyl ether (Diethyl Ether)	Very Good	Good	Very Good	Good	Excellent	Excellent
Ethylene dichloride (1,2 Dichloroethane)	Fair	Poor	Fair	Poor	Excellent	Not Tested
Ethylene glycol	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Formaldehyde	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Formic acid	Very Good	Very Good	Very Good	Very Good	Very Good	Excellent
Freon 11	Good	Poor	Fair	Good	Not Tested	Not Tested
Freon 12	Good	Poor	Fair	Good	Not Tested	Not Tested
Freon 21	Good	Poor	Fair	Good	Not Tested	Not Tested
Freon 22	Good	Poor	Fair	Good	Not Tested	Not Tested
Furfural	Good	Good	Good	Good	Excellent	Excellent
Gasoline, leaded	Good	Poor	Fair	Very Good	Excellent	Not Tested
Gasoline, unleaded	Good	Poor	Fair	Very Good	Excellent	Very Good
Glycerin	Very Good	Very Good	Very Good	Very Good	Not Tested	
Hexane	Fair	Poor	Poor	Good	Excellent	Excellent
Hydrazine (65%)	Fair	Good	Good	Good	Excellent	Not Tested
Hydrochloric acid	Very Good	Good	Good	Good	Excellent	Excellent
Hydrofluoric acid (48%)	Very Good	Good	Good	Good	Excellent	Excellent
Hydrogen peroxide (30%)	Good	Good	Good	Good	Excellent	Not Tested
Hydroquinone	Good	Good	Good	Fair	Excellent	Not Tested
Isooctane	Fair	Poor	Poor	Very Good	Not Tested	Excellent
Kerosene (Jet A-1, JP-5, JP-8)	Very Good	Fair	Fair	Very Good	Excellent	Excellent
Ketones	Good	Very Good	Very Good	Poor	Excellent	Excellent
Lacquer thinners	Good	Fair	Fair	Poor	Excellent	Not Tested
Lactic acid (85%)	Very Good	Very Good	Very Good	Very Good	Not Tested	Excellent
Lauric acid (36%)	Very Good	Fair	Very Good	Very Good	Not Tested	Not Tested
Lineolic acid	Very Good	Poor	Fair	Good	Not Tested	Not Tested
Linseed oil	Very Good	Poor	Fair	Very Good	Not Tested	Not Tested
Maleic acid	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Methyl alcohol	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Methylamine	Fair	Fair	Good	Good	Fair	Excellent
Methyl bromide	Good	Fair	Good	Fair	Not Tested	Not Tested
Methyl chloride	Poor	Poor	Poor	Poor	Excellent	Not Tested
Methyl ethyl ketone	Good	Good	Very Good	Poor	Excellent	Excellent
Methyl isobutyl ketone	Fair	Fair	Very Good	Poor	Excellent	Excellent
Methyl methacrylate	Good	Good	Very Good	Fair	Excellent	Excellent
Monoethanolamine	Very Good	Good	Very Good	Very Good	Not Tested	Not Tested
Morpholine	Very Good	Very Good	Very Good	Good	Excellent	Excellent
Naphthalene	Good	Fair	Fair	Good	Excellent	Not Tested
Napthas, aliphatic	Very Good	Fair	Fair	Very Good	Excellent	Excellent
Napthas, aromatic	Good	Poor	Poor	Good	Excellent	Excellent
Nitric acid	Good	Fair	Fair	Fair	Excellent	Excellent
Nitric acid, red and white fuming	Poor	Poor	Poor	Poor	Excellent	Excellent
Nitromethane (95.5%)	Fair	Poor	Fair	Fair	Excellent	Excellent
Nitropropane (95.5%)	Fair	Poor	Fair	Fair	Excellent	Excellent
Octyl alcohol	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Oleic acid	Very Good	Fair	Good	Very Good	Not Tested	Not Tested
Oxalic acid	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Palmitic acid	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Perchloric acid (60%)	Very Good	Fair	Good	Good	Excellent	Not Tested
Perchloroethylene	Fair	Poor	Poor	Good	Excellent	Excellent
Petroleum distillates (Naptha/mineral spirits, Stoddard Solvent)	Good	Poor	Poor	Very Good	Excellent	Excellent
Phenol	Very Good	Fair	Good	Fair	Excellent	Excellent
Phosphoric acid	Very Good	Good	Very Good	Very Good	Excellent	Excellent
Potassium hydroxide	Very Good	Very Good	Very Good	Very Good	Excellent	Not Tested
Propyl acetate	Good	Fair	Good	Fair	Excellent	Not Tested
Propyl alcohol (Propanol)	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Propyl alcohol (Isopropyl alcohol)	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Sodium hydroxide	Very Good	Very Good	Very Good	Very Good	Excellent	Excellent
Styrene	Poor	Poor	Poor	Fair	Excellent	Excellent
Styrene (100%)	Poor	Poor	Poor	Fair	Excellent	Excellent
Sulfuric acid	Good	Good	Good	Good	Excellent	Excellent
Tannic acid (65%)	Very Good	Very Good	Very Good	Very Good	Not Tested	Not Tested
Tetrahydrofuran	Poor	Fair	Fair	Fair	Excellent	Excellent
Toluene	Fair	Poor	Poor	Fair	Excellent	Excellent
Toluene diisocyanate (TDI)	Fair	Good	Good	Fair	Excellent	Excellent
Trichloroethylene	Fair	Fair	Poor	Good	Excellent	Excellent
Triethanolamine (85%)	Very Good	Good	Good	Very Good	Excellent	Not Tested
Tung oil	Very Good	Poor	Fair	Very Good	Not Tested	Not Tested
Turpentine	Good	Fair	Fair	Very Good	Not Tested	Excellent
Xylene	Poor	Poor	Poor	Fair	Excellent	Excellent

**Note: This data in this table pertaining to Neoprene, Natural Latex/Rubber, Butyl, and Nitrile gloves was constructed using data contained in Table 4 of the Federal Occupational Safety and Health Administration (OSHA) Personal Protective Equipment (PPE) Guide (3151-12R-2003).*

The OSHA PPE Manual can be viewed by clicking this link: OSHA PPE Guide

***Data for the Multi-Layer Laminate Silver Shield gloves was compiled from data in the North Safety Silver Shield/4H Chemical Protection Guide and North Safety Chemical Resistance Guide.*

North Safety Silver Shield/4H Chemical Protection Guide

North Safety Chemical Resistance Guide

****Data for the Multi-Layer Laminate Barrier gloves was compiled from data in the Ansell Chemical Resistance Guide, Permeation and Degradation Data (8th Edition).*

Ansell Chemical Resistance Guide, Permeation and Degradation Data (8th Edition)

Always check the Material Safety Data Sheet (MSDS) or label on the product container to determine the specific chemicals that comprise the product.

BACK TO HAND PROTECTION SELECTION MATRIX

Chemical Hand Protection Selection Matrix

STOCK SYSTEM DESCRIPTION: GLOVES, CHEMICAL AND OIL PROTECTIVE, DISPOSABLE

Green nitrile (plastic), chemical resistant, gauntlet length (14"), 13 mil thickness
NSN: 8415-01-147-9540- Size 8
NSN: 8415-01-012-9294- Size 9
NSN: 8415-01-013-7382- Size 10
NSN: 8415-01-013-7384- Size 11
NAVSEA SPIN #: 02086

For added protection, use disposable nitrile gloves as an underlayer.

BACK TO HAND PROTECTION SELECTION MATRIX

STOCK SYSTEM DESCRIPTION: TBD

Chemical Resistant Neoprene (synthetic) rubber

Provides good protection from a wide variety of chemicals such as many oils, acids, bases, and some solvents

As of February 2013, MIL-DTL 32066 is being rewritten to provide additional clarity on chemical protective neoprene glove requirements.

As an interim measure, several neoprene glove options from GSA Advantage are listed below.

Click here to access GSA Advantage.

NAVSEA SPMIG Description: Gloves, Chemical Resistant, Neoprene (Synthetic) Rubber

Glove Size	GSA Advantage Stock #:	NAVSEA SPIN #
7 (XS)	N101F74	19971 E
8 (S)	N101F75	19971 F
9 (M)	N101F76	19971 G
10 (L)	N101F72	19971 H
11 (XL)	N101F73	19971 I

Notes: 13" length,18 mil thickness, cotton flocked lining, Made in United Kingdom

Cost: $3.92/pair

Glove Size	GSA Advantage Stock #:	NAVSEA SPIN #
7 (XS)	N/A	N/A
8 (S)	3414-08	19971 A
9 (M)	3414-09	19971 B
10 (L)	3414-10	19971-C
11 (XL)	3414-11	19971-D

Notes: 14" length, 16 mil thickness, cotton lining, Made in USA

Cost: $8.87/pair

Glove Size	GSA Advantage Stock #:	NAVSEA SPIN #
7 (XS)	723 07	19971 J
8 (S)	723 08	19971 K
9 (M)	723 09	19971 L
10 (L)	723 10	19971 M
11 (XL)	N/A	N/A

Notes: 12" length, 28 mil thickness, flock lining, Made in Guatemala

Cost: $5.14/pair

BACK TO HAND PROTECTION SELECTION MATRIX

STOCK SYSTEM DESCRIPTION: GLOVES, TOXICOLOGICAL AGENTS PROTECTIVE

Black butyl (synthetic) rubber, acid/base resistant (and some solvent) resistant, gauntlet length (about 14")
NSN: 8415-00-753-6551- Size Small
NSN: 8415-00-753-6552- Size Medium
NSN: 8415-00-753-6553- Size Large
NAVSEA SPIN #: 02085

For added protection, use disposable nitrile gloves as an underlayer.

BACK TO HAND PROTECTION SELECTION MATRIX

STOCK SYSTEM DESCRIPTION: GLOVES, CHEMICAL AND OIL PROTECTIVE

Black natural rubber coated with PVC (polyvinyl chloride).
Provides resistance from diluted acids/bases, fuels and oils and some solvents.
NSN: 8415-00-916-2817- Size Medium
NSN: 8415-00-916-2818- Size Large
NSN: 8415-00-935-2833- Size Universal
NAVSEA SPIN #: 00517

For added protection, use disposable nitrile gloves as an underlayer.

BACK TO HAND PROTECTION SELECTION MATRIX

STOCK SYSTEM DESCRIPTION: GLOVES, CHEMICAL PROTECTIVE

Black natural rubber (latex), dilute acid/base resistant, gauntlet length (about 14")
NSN: 8415-00-266-8679- Size 9
NSN: 8415-00-266-8677- Size 10
NSN: 8415-00-266-8675- Size 11
NAVSEA SPIN #: 00525

For added protection, use disposable nitrile gloves as an underlayer.

BACK TO HAND PROTECTION SELECTION MATRIX

STOCK SYSTEM DESCRIPTION: Gloves, Disposable

Thin (4 and 8 mil) nitrile gloves, designed for general purposes.
These gloves can provide light splash protection (incidental exposure) for certain chemicals.
They are not intended for immersion in liquid chemicals or for continued wear when contaminated with chemicals.
These gloves come in various colors (purple, blue, black, etc.)
The 4 mil thick version can be DOUBLE-GLOVED (2 pairs on each hand) to provide protection similar to the 8 mil thick version.

Outer layer should be changed every couple of hours or sooner if contaminated by chemical.

4 mil thick glove
NSN: 8415-01-492-0179 (Size 7-8)
NAVSEA SPIN: 17934

8 mil thick glove
NSN: 8415-01-447-8212
NAVSEA SPIN: 02826

NOTE: Disposable latex glove like the medical type pictured above should never be used for chemical protection.

BACK TO HAND PROTECTION SELECTION MATRIX

STOCK SYSTEM DESCRIPTION: TBD

MULTI-LAYER LAMINATE FILM
Thin (2.7 mil) multi-layer laminate construction provides excellent protection against most chemicals.
The laminate construction makes these gloves feel very different than the other types of gloves discussed in this matrix.
These gloves are ambidextrous and can be worn on either hand.
If desired, they can be reused as long as they are not damaged or soiled with chemical residue, but disposal after use is recommended if contaminated with chemical.
These gloves are relatively delicate and can be punctured or torn more easily than other glove types.
To enhance dexterity and to protect the laminate material, a pair of thin, disposable nitrile gloves (4 or 8 mil) should be worn as an outer layer on each hand.
The nitrile outer layer should be removed and replaced if they become soiled with chemical.

As of February 2013, MIL-DTL 32066 is being rewritten to provide additional clarity on chemical protective neoprene glove requirements.
As an interim measure, several neoprene glove options from GSA Advantage are listed below.

Click here to access GSA Advantage.

NAVSEA SPMIG Description: Gloves, Chemical Resistant, Multi-Layer Laminate

Silver Shield Gloves

Glove Size	GSA Advantage Stock #:	NAVSEA SPIN #
7 (XS)	SSG/7	19972 A
8 (S)	SSG/8	19972 B
9 (M)	SSG/9	19972 C
10 (L)	SSG/10	19972 D
11 (XL)	SSG/11	19972 E

Notes: 14.5" length, 5-layer, 2.5 mil thickness, no liner, Made in Mexico
Cost: About $4-$5/pair

Barrier Gloves

Glove Size	GSA Advantage Stock #:	NAVSEA SPIN #
7 (XS)	N101Z91	19972 F
8 (S)	N101Z92	19972 G
9 (M)	N101Z93	19972 H
10 (L)	N101Z94	19972 I
11 (XL)	N101Z95	19972J

Notes: 15" to 16" length, 5-layer, 2.5 mil thickness, non-woven liner, Made in USA
Cost: About $6-$7/pair

BACK TO HAND PROTECTION SELECTION MATRIX