Table Key

IMP	Impact	Hazards from debris, cuts, flying particles, and crushing to any part of the hand, face or body.
ERG	Ergonomics	Hazards due to repetitive motion and lifting
BIO	Biohazard	Hazards due to exposure to blood or other potentially infectious materials (see SCCC's Exposure Control Plan for more information)
CH	Chemical	Hazards due to splash or splatter of chemicals, i.e. liquid, gas, solids (see SCCC's Hazard Awareness and Chemical Hygiene plans for more information)
HEAR	Noise level	Hazards due to excessive noise level/prolonged exposure to noisy conditions
ZOO	Zoonosis	Hazard due to diseases transmitted from animal to human, i.e. rabies
EL	Electrical	Hazards due to electrical systems and wiring
CS	Confined Space	Hazards due to issues of confined space (see SCCC's Confined Space plan for more information)
TEMP	Temperature	Hazards due to extreme temperatures i.e.x-ray
INF	Infrared	Hazards in welding situations due to infrared rays
FALL	Fall	Hazard due to falling from heights (more than 4 feet)
VEH	Vehicle	Hazard due to being hit by a moving vehicle
RAD	Radiation	Use of X-Ray machine

Terms
SDS- Safety Data Sheet/Material Safety Data Sheet

PPE Selection
Eye Protection selection- https://www.osha.gov/SLTC/etools/eyeandface/ppe/impact.html

Glove Selection

See the section at the end of this document.

Respirator Selection
Contact EH&S (x6771)

TASK	HAZ TYPE	ASSESMENT	PPE
Application of pesticide, herbicide	CH	Applying chemicals	As per product label or SDS
Automotive, Equipment repair, servicing	IMP, CH, ERG, HEAR	sharp objects; chemical exposure; lifting, noisy equipment	Gloves (see below), eye protection, protective clothing, safety shoes, hearing protection (if necessary)
Carpentry	IMP, EL, HEAR	Flying debris, cuts from sharp wood/machinery; electrical hazard from equipment; dust, noisy equipment	Gloves (see below), eye protection, safety shoes, dust mask, hearing protection (if necessary)
Ceiling tile replacement	IMP, FALL	Debris, falling off ladder	Eye protection, gloves (see below), dust mask *if work requires worker to be more than 4 feet above the ground, Fall protection is required
Clean up of Blood or infectious materials	BIO, CH	Skin and eye contact with chemical products; Skin and eye contact with Blood/Infectious materials	Gloves (see below), safety glasses, protective clothing
Clean windows, General Cleaning	CH	Skin and eye contact with chemical products	Gloves (see below), safety glasses if specified by SDS
Cleanup of dead animals	ZOO, BIO	Possible exposure to infectious materials	Gloves (see below), safety glasses, protective clothing, shovel
Cooking	TEMP, IMP	Burned by hot/cold items, cut by knives/cutting equipment	Gloves (see below), eye protection (if necessary)
Drive Vehicle	IMP, ERG, CH, VEH	Car accident	Seat belt
Dusting	none		
First Aid/CPR	BIO	Skin and eye contact with Blood/Infectious materials	Gloves (see below), protective clothing
Floor cleaning and polishing	ERG, CH, EL	Skin and eye contact with polishes and chemical products; Electrical hazard due the use of electrical	Gloves (see below), eye protection, safety shoes, protective clothing; GFCI on either outlet or equipment

		equipment in damp and wet areas; Lifting and moving of furniture	
General Cleaning of Nursing Offices, Nursing Classrooms, EMT classrooms, Vet Sci areas	BIO, CH	Possible exposure to infectious materials; Skin and eye contact with chemical products	Gloves (see below), eye protection, protective clothing
General Grounds Keeping	ERG, IMP, CH, HEAR	Fly particles, falling tree limbs, cuts from sharp objects, ergonomic issues, noise from machinery, machinery hazards	Gloves (see below), eye protection (if cutting, trimming or clearing), hearing protection if working with or near equipment, chaps if using chain saw, hard hat if danger from falling debris
Handling Chemicals	CH	Skin and eye contact with chemical products	Gloves (see below), safety glasses, any additional PPE specified by product SDS
Heavy Equipment Operation	IMP, VEH, HEAR	Vehicle Accident; Lifting; crushing, noisy equipment	Hard hat, Hi-visibility vest, safety shoes, seat belt, hearing protection (if necessary)
Instrument Cleaning	BIO, CH, IMP, ZOO	Exposure in chemicals; infectious materials; cuts from sharp instruments	Gloves (see below), eye protection, protective clothes
Kiln	TEMP	Burns from hot materials	Gloves (see below), eye protection, protective clothes
Laboratory Work	IMP, CH, BIO	Possible exposure to infectious materials; Skin and eye contact with chemical; Cut danger from equipment and broken glass	Gloves (see below), safety glasses, any additional PPE specified by chemical SDS
Machinery maintenance and repair	EL, IMP, CH	Electrical; sharp objects; chemical exposure; possible noisy environment	Gloves (see below), eye protection, protective clothing, safety shoes, hearing protection (if necessary) *if working with high voltage equipment, MUST use proper high voltage PPE, including arc-flash gear
Masonry or cement work	CH, HEAR	Contact of materials with skin, noise from cutting equipment	Gloves (see below), protective clothing, hearing protection (if necessary)

Medical Procedure	BIO, IMP, ZOO, ERG	Possible exposure to infectious materials; Cuts from sharp instruments; Lifting	Gloves (see below), eye protection, protective clothing, mask
Minor Maintenance tasks	IMP, ERG, CH	Skin and eye contact with chemical products; Lifting or dropping items; Sharp objects, falling debris	Gloves (see below), safety glasses if specified by SDS; Safety shoes; Gloves (see below), hard hat, eye protection
Moving heavy items or equipment	ERG	Lifting or dropping items	Safety shoes
Painting (brush)	CH, FALL	Paint in eyes, possible fall hazard	Gloves (see below), eye protection *if work requires worker to be more than 4 feet above the ground, Fall protection is required
Painting (spray)	CH, FALL	Paint in eyes, inhalation of paint; possible fall hazard	Gloves (see below), eye protection, respirator *if work requires worker to be more than 4 feet above the ground, Fall protection is required
Replacing bulbs, ballasts and fixtures	IMP, EL, FALL	Cuts from broken bulbs, falls, falling minor debris	Gloves (see below), eye protection *if working on units requiring worker to be more than 4 feet above the ground, Fall protection is required
Roadwork	CH, ERG	Lifting, shoveling asphalt	Gloves (see below), safety shoes, safety vest
Salting/sanding	CH	Chemical contact with skin	Gloves (see below)
Sewage Treatment Plant: Minor equipment repair/service	IMP, CH, ERG, FALL	Skin and eye contact with chemical products; Lifting or dropping items; Sharp objects; falling debris; possible fall	Gloves (see below), eye protection, protective clothing, safety shoes *if work requires worker to be more than 4 feet above the ground, Fall protection is required
Sewage Treatment Plant: Work with sludge	CH, BIO, FALL	Possible exposure to infectious materials; Skin and eye contact	Gloves (see below), eye protection, protective clothing, safety shoes

		with chemical; Possible fall	*if work requires worker to be more than 4 feet above the ground, Fall protection is required
Snow Shoveling	ERG	Lifting and moving snow, cold	Safety shoes, cold weather protection
Spray Equipment	IMP, CH	Eye and skin contact hazard from debris and chemicals	Gloves (see below), eye protection, protective clothing, possibly respirator
Stage Work	IMP, CH, FALL, EL, ERG	Skin and eye contact with paint; Cut danger from equipment; lifting; Electrical shock; possible fall if working more than 4 feet above the ground.	Gloves (see below), eye protection, safety shoes *if work requires worker to be more than 4 feet above the ground, Fall protection is required
Vacuum Carpets	none		
Welding, soldering, cutting, grinding, pipefitting	IMP, CH, FALL, EL, ERG, HEAR	Contact with chemicals; cuts from sharp objects and equipment; Particle danger; danger from welding/soldering equipment; lifting; possible electrical if area/items wet; possible fall if working more than 4 feet above the ground. Noise from cutting/grinding equipment	Gloves (see below), eye protection (appropriate to equipment being used), protective clothing, safety shoes, mask if grinding, hearing protection (if necessary) *if work requires worker to be more than 4 feet above the ground, Fall protection is required
Wood Chipper	IMP, ERG, VEH, HEAR	Contact with cutting blades, flying debris, lifting, vehicle danger if working in the roadway	Hard Hat, Eye Protection, boots, hearing protection gloves (no loose cuffs), no loose clothing/jewelry
Working on/near roadways	IMP, VEH	Hit by vehicle	Hard hat, Hi-visibility vest
Working with X-ray machine	RAD, ERG	Possible exposure to radiation; lifting animals	Proper x-ray protective apron/clothing

GLOVE SELECTION GUIDE

The following is a list of gloves and their appropriate application, according to the National Safety Council:

- **Cotton and fabric gloves:** These can keep hands clean and protect against abrasions, but may not be strong enough to handle work with rough or sharp materials.
- **Coated fabric gloves:** This type of glove can provide protection against some moderate concentrated chemicals. They can be used in laboratory work provided they are strong enough to protect against the specific chemical being handled.
- **Rubber, plastic or synthetic gloves:** These types of glove can be used when cleaning or working with oils, solvents and other chemicals.
- **Leather gloves:** These should be used when welding, as the leather can resist sparks and moderate heat. The risk of cuts and abrasions also can be minimized by wearing leather gloves.
- **Aluminized gloves:** These gloves are recommended for welding, furnace and foundry work, as they provide reflective and insulating protection.
- **Kevlar gloves:** These have a wide variety of industrial applications. They are cut- and abrasion-resistant and provide protection against both heat and cold.
- **Chemical/liquid-resistant gloves:** Several types of gloves help protect against specific chemicals:
    - **Butyl rubber gloves:** nitric acid, sulfuric acid, hydrochloric acid and peroxide
    - **Natural latex/rubber gloves:** Blood, body fluids, infectious agents, water solutions or acids, alkalis, salts, and ketones
    - **Neoprene gloves:** hydraulic fluids, gasoline, alcohols and organic acids
    - **Nitrile rubber gloves:** Blood, body fluids, infectious agents, chlorinated solvents

GLOVE SELECTION FOR CHEMICAL/BIOLOGIACAL HAZARDS

According to OSHA's hand protection standard (29 CFR 1910.138), employers must select and require employees to use appropriate hand protection when employee's hands are exposed to hazards such as hazardous chemicals. Employees must know when gloves are necessary, what type of gloves are necessary, how to properly put on, take off, adjust and wear them, glove limitations, and their proper care, maintenance, useful life, and disposal (contact EH&S x6771 for assistance). Gloves made of rubber (latex, nitrile, or butyl), plastic, or synthetic rubber-like materials such as neoprene can protect workers from chemical hazards and also reduce the risk of exposure to blood and other potentially infectious materials.

Four Basic Factors to Consider

When selecting protective gloves, there are four basic factors to consider –

- How toxic is the material if absorbed through the skin?
- How the glove will be used?
- Using manufacturer test data for glove selection.
- Cost considerations.

How toxic is the material if absorbed through the skin?

Information pertaining to a specific chemical can be obtained from Material Safety Data Sheets (SDS), Lab Chemical Safety Summaries for common lab chemicals, OSHA Exposure Limits,

ACGIH Exposure Limits, and toxicology studies. Key words are "S" or skin, dermal, LD50 dermal, or skin vapor hazard. If the LD50 value for dermal studies for a particular chemical is below 5 mg/kg careful attention should be paid to glove selection.

How will the gloves be used?
What is the anticipated contact with the chemical? Are there any dexterity or durability needs to consider? Are disposable or reusable gloves needed?

Contact with Material
Is direct contact with the material expected or will gloves be used as a precaution for accidental contact? Are other chemicals that are easily absorbed through the skin or are carriers being used with the toxic material? Carriers are used intentionally to allow beneficial drugs such as prescription ointments to pass through the skin. Consider whether you are also using skin-absorbing chemicals such as DMSO that could intentionally increase skin exposure potential to toxic chemicals. If so, ensure that you are protected for all chemicals used.

Dexterity and Durability Needs
Will you be handling small containers, test tubes, or larger bulky items? Generally, higher resistance to chemical absorption is achieved with thicker gloves or gloves that are less flexible. If the ability to feel and handle smaller, breakable containers is required wearing a tight fitting, thin, flexible glove over the less flexible glove may improve dexterity. Will the gloves be used for handling sharp or rough objects? Degradation testing information will provide an indication of how gloves hold up physically and whether they develop pinholes or tear easily.

Disposable versus Reusable Gloves
How will reusable gloves be decontaminated and stored safely between uses. When gloves are put on and taken off frequently, the use of disposable gloves versus reusable gloves avoids the need for decontamination between uses. Remember both types of gloves will ultimately need to be disposed of in a safe manner.

Using Manufacturer Test Data for Glove Selection
Manufacturers test gloves by immersing the glove in a particular chemical and checking three factors called degradation, permeation, and permeation rate. Degradation tests provide information about how the glove responds physically, e.g., how easily are pinholes or tears developed? Permeability tests provide information on chemical break-through time or how long it takes for the chemical to move through the glove material. Permeability rate tests show how fast the chemical continues to pass through the glove once it has initially broken through. Knowing the permeation rate of a particular type of glove can be an important factor to consider when working with highly toxic skin absorbers that may not cause pain or otherwise warn the user that break-through or chemical contact has occurred.

What if no test data is available? Consider how the chemical could be handled differently to avoid direct skin contact. Speak to the glove manufacturer about their recommendation to see if testing is ongoing or planned.

Cost Considerations.

Safety, not cost, is the primary factor in selecting gloves, but sometimes cost can be reduced while still selecting gloves that are adequate for their intended use. For example, if the gloves will be used for short times periods, such as 15 minutes, you do not necessarily need a glove that has been tested for 240 or 480 minutes – the 60-minute glove may be adequate.

General Characteristics for Some Commonly Used Gloves.

Butyl Rubber Gloves

These gloves protect against nitric acid, sulfuric acid, hydrofluoric acid, red fuming nitric acid, and peroxide. Butyl rubber gloves are highly impermeable to gases, chemicals, and water vapor. In addition, they resist abrasion and remain flexible at low temperatures.

Natural Latex or Rubber Gloves

These gloves protect worker's hand from most water solutions of acids, alkalis, salts, and ketones. They are not recommended for working with non-water solution hazardous chemicals. They are frequently used to protect against contact with blood or other potentially infectious materials. Thin surgical-style latex gloves offer only limited protection from many chemicals.

Latex gloves have caused allergic reactions in some individuals. Hypoallergenic gloves, glove liners, and powderless gloves are possible alternatives for individuals who are allergic to latex gloves.

Neoprene Gloves

Neoprene gloves provide protection against a broad range of corrosives chemicals. They are resistant to oils, greases, alcohols, resins, alkalis, organic acids, and many solvents. Neoprene has poor resistance to chlorinated aromatic solvents, phenols, and ketones. These gloves have good pliability, finger dexterity, high density, and tear resistance.

Nitrile Gloves

Nitrile gloves are a good choice if work involves aromatic petroleum, and chlorinated solvents such as trichloroethylene and perchloroethylene. Nitrile gloves stand up to heavy use even though they are designed for work where dexterity and sensitivity are required. They are generally resistant to abrasions, punctures, snags, and tears.

Helpful Links to Glove Manufacturer's Selection Information

Always check the specific manufacturer's glove test data prior to purchasing and using a specific type of glove. Though glove materials are similar, glove thickness, lining, and other features may vary that can affect test results and chemical resistance.

1. Ansell Protective Products Online Chemical Hand Protection Guide
   Chemical Hand Protection Guide; enter your chemical of interest
2. Ansell Chemical Resistance Guide
   Chemical protection selection guide in table format
3. Best Manufacturing Glove Selection Guide
   Chemical glove selection guide; enter your chemical of interest (select „United States. at first window)

4. DuPont (cut-resistant Kevlar, gloves)
   General product information
5. Marigold Industrial
   Chemical recommendation guide
6. MCR Glove Permeation Guide
   Enter the chemical of interest
7. North Hand Protection
   Links to several types of hand protection
8. North Selection Guide for Hand Protection Software (need to login)
   Download a chemical resistant glove selection guide
9. North Silver Shield/4H Chemical Protection Guide
   Permeation and breakthrough data specifically for Silver Shield/4H® gloves.
10. Kimberly Clark Professional (including Safeskin Glove)
    Main glove page
11. Kimberly Clark Technical Glove Data
    Technical data; chemical resistance database

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