Glove Selection Guide

1. **SCOPE**

There is no one type of glove that will protect against all the hazards encountered in the workplace. That is why it is important to conduct a risk assessment prior to the purchase and selection of any gloves in order to determine the aspects of use and the type of glove to suit the task or tasks being performed.

This guideline should be consulted when choosing which glove to be worn to protect against a specific hazards.

2. **DEFINITIONS**

Usual terms referred to in glove compatibility charts are:

- **Breakthrough time**: Time it takes for the chemical to travel through the glove material. This is only recorded at the detectable level on the inside surface of the glove.

- **Permeation Rate**: The rate at which the chemical passes through the glove material. This involves the absorption of the chemical into the glove material, migration of the chemical through the material, and then desorption once it is inside the glove.

- **Degradation rating**: The change to the physical properties of the glove as it is affected by the chemical. This includes, but is not limited to swelling, shrinking, hardening, cracking, etc. of the glove material.

3. **RESPONSIBILITY**

**Supervisor**

- Train workers on proper glove use and removal techniques
- Provide access to appropriate gloves for various tasks

**Employee**

- Select an appropriate glove for a given task
4. **TRAINING REQUIRED**

At the workplace, training should be provided on the appropriate use of gloves. This training includes:

- How to choose the right type of glove for the task
- Appropriate method of glove removal
- Cleaning and maintenance
- How to inspect gloves for wear and tear

5. **HAZARDS**

Gloves can be used to protect against exposure to several different types of hazards.

<table>
<thead>
<tr>
<th>Type of hazard</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical</td>
<td>Glove selection guides can be found in catalogs of various scientific and safety suppliers. Gloves are rated for degradation, breakthrough, and permeation rates. Choose a glove that provides the best resistance to the chemical being used. For some hazards, double gloving may be needed.</td>
</tr>
<tr>
<td>Biological</td>
<td>Standard latex exam gloves provide protection for biological hazards. Non-latex gloves such as synthetic rubber, nitrile, vinyl, or neoprene also provide acceptable barrier protection against biological hazards without the potential to cause severe allergic reactions associated with latex. If required, sterile packaged gloves are also available from various brands. Note: for combination of biological and chemical hazards, the chosen glove must provide protection from both the chemical and the biological material.</td>
</tr>
<tr>
<td>Radioactive</td>
<td>For radioactive hazards, glove selection is based on the carrier material (e.g. water, toluene, etc.). Radiiodination procedures require double gloving.</td>
</tr>
<tr>
<td>Physical (sharps, extreme</td>
<td>Cut resistant gloves should be worn when working with sharp objects or glass that may shatter. Thermally protective gloves are necessary to protect against hot and cold burns. It is important to consider the level of dexterity required by the task as some of the gloves can reduce dexterity.</td>
</tr>
<tr>
<td>extreme temperatures)</td>
<td></td>
</tr>
<tr>
<td>Combination of chemicals</td>
<td>Where different chemicals have different recommended glove material, the best choice is usually the glove with the greatest resistance to the chemical (e.g. the slowest breakthrough time). In some cases, it may be necessary to double glove when no single type of glove material will provide full protection. In this case, it is advisable to select two sets of gloves made from different materials. If one chemical is significantly more dangerous (e.g. highly toxic) than others, then this may take priority for choice of glove material rather than chemical breakthrough time. Seek advice from your supervisor if you are uncertain about which should take priority (i.e. fastest breakthrough time or highest toxicity).</td>
</tr>
</tbody>
</table>
6. **GLOVE SELECTION**

To ensure the most appropriate glove(s) are used for the task and environmental conditions, it is necessary to consider several important factors (e.g. the type of hazard and its properties, the manual dexterity required, the duration and nature of contact, etc.). Use the tables below to help you with the selection process.
### GLOVE SELECTION GUIDE

1. **Identify the hazard**

   Base selection of glove type and material on the type of exposure and nature of the hazard. Some chemicals can easily penetrate gloves that work very well for other chemicals.

   Consider:
   - chemical type
   - physical hazards (sharps, piercing objects)
   - temperature extremes
   - pH
   - toxicity
   - infectious potential of biological hazards

   Read the Safety Data Sheets (SDSs) for the chemical(s) involved.

2. **Determine the type of contact**

   **Incidental contact** (little or no direct contact) includes these situations:
   - accidental spills or splashes
   - accidental overspray from a dispensing device
   - handling infectious agents that require barrier protection
   - to prevent contamination of materials during handling

   **Extended contact** includes these situations:
   - handling highly contaminated materials
   - submerging hands in a chemical or other hazardous substance
   - need for physical protection from temperature extremes or sharp/piercing objects

3. **For incidental contact**

   1. Type of glove: disposable, surgical-type gloves are appropriate for incidental contact.
   2. Nitrile gloves are preferred over latex because their chemical resistance, their tendency to visibly rip when punctured, and to prevent latex allergies (see the "Advantages and disadvantages of glove materials" section)
   3. Disposable glove usage:
      - check for rips or puncture before use
      - remove and replace gloves immediately with new ones when a chemical spills or splashes on them
      - never wash or reuse disposable gloves
      - always remove glove before touching common objects as doorknobs or phones

4. **For extended contact**

   1. Type of glove: more substantial gloves are required for extended use (see "Advantages and disadvantages of glove materials" section)
   2. Reusable glove usage: many gloves intended for extended contact are reusable
      - check gloves for
        - rips or punctures before and after each use
        - prior contamination
        - signs of degradation (change in color or texture)
      - replace gloves as soon as signs of degradation appear
      - wash after removal and air dry in the laboratory
      - consider wearing inner surgical gloves for extra protection

5. **Dispose of used and damaged gloves**

   Disposed of gloves according to whether or not they are contaminated with a hazardous material.
   - No contamination: place in the regular lab trash
   - Radioactive materials: see the Radiation Reference Manual
   - Chemical and Biohazardous material contamination: see the Hazardous Waste Disposal Guide

   **ALWAYS** wash your hands after removing gloves.
### 7. ADVANTAGES AND DISADVANTAGES OF GLOVE MATERIALS*

<table>
<thead>
<tr>
<th>Glove material</th>
<th>Protects against</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural rubber (Latex)</td>
<td>Biological hazards</td>
<td>Excellent tensile strength and elasticity</td>
<td>Can cause allergic reactions</td>
</tr>
<tr>
<td>Butyl</td>
<td>Peroxide, strong acids and bases, alcohols, aldehyde, ketones, esters.</td>
<td>Protects against a wide variety of chemicals</td>
<td>Do not use with aliphatic and aromatic hydrocarbons and halogenated solvents</td>
</tr>
<tr>
<td>Neoprene</td>
<td>Alcohols, oxidizing acids, hydraulic fluids, phenol, glycol ethers</td>
<td>Good pliability, finger dexterity, high density and tear resistance</td>
<td>Poor for halogenated and aromatic hydrocarbons</td>
</tr>
<tr>
<td>Nitrile (disposable or reusable)</td>
<td>Biological hazards</td>
<td>Good dexterity and sensitivity</td>
<td>Poor against strong oxidizing agents, benzene, methylene chloride, phenol, ketones, acetates and aromatic solvents</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>Strong acids and bases, salts, and other water solutions</td>
<td>Can be used for immersion, less dexterity and sensitivity</td>
<td>Plasticizers can be stripped, poor tear resistance</td>
</tr>
<tr>
<td>Cryogenic gloves</td>
<td>Cryogens</td>
<td>Protects against tissue damage from cryogens or very cold containers and equipment</td>
<td>Not for immersion</td>
</tr>
<tr>
<td>Leather</td>
<td>Welding, sheet metal work, handling hot or cold objects, gardening</td>
<td>Provides protection against heat, cold, sparks and cuts, they come in a wide variety of styles and fit</td>
<td>Not for working with liquids and when wet will offer poor protection against heat and cold</td>
</tr>
<tr>
<td>Kevlar brand fiber</td>
<td>Work where temperature extremes are an issue</td>
<td>Protects against tear, abrasion and cutting</td>
<td>Thicker gloves can impede movement</td>
</tr>
<tr>
<td>Mesh gloves</td>
<td>Used for work that requires repeated cutting and slicing</td>
<td>Protects against cutting and slicing</td>
<td>Steel mesh gloves can be heavy and impede movement</td>
</tr>
<tr>
<td>Aluminized gloves</td>
<td>Furnace work, handling hot objects</td>
<td>Provides good protection against heat</td>
<td>Not to be used for electrical work</td>
</tr>
<tr>
<td>Cotton</td>
<td>General duty work</td>
<td>Moderate resistance to heat and cold</td>
<td>May need to be thicker to offer full protection</td>
</tr>
</tbody>
</table>

* The photos included are examples; glove colors and appearances will vary.
8. **ADDITIONAL RESOURCES**

Use these additional resources for information on specific chemicals or glove materials.

Chemical compatibility and permeation charts

- Ansell – Chemical Resistance Guide
- VWR Chemical Resistance Guide
- Fisher HealthCare Chemical Resistance Guide
- Kimberly-Clark Nitrile Glove Chemical Resistance Guide
- North Chemical Resistance Guide
- Microflex

Vendor sites

- Fisher Scientific
- VWR
- Kimberley-Clark
- Honeywell – Protective gloves
- Grainger
- Medicom
- Microflex
- Shield Scientific
- Superior Glove

Glove sizing

- Fisher Scientific Glove Sizing Guide
- Grainger Safety Glove Size Chart

General

- World Health Organization – Glove use information
- Canadian Centre for Occupational Health and Safety – Glove selection
- WorkSafe BC – Glove removal procedure

9. **REVIEW AND RETENTION**

This guideline is reviewed annually or whenever deemed necessary by the responsible departmental representative in Risk Management Services.

10. **DOCUMENT INFORMATION**

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