Personal Protective Equipment (P.P.E) for Chemical Handling – Hand Protection

Conducted by:
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Definition of P.P.E

Means any equipment which is intended to be worn or held by a person at work and which protects him against one or more risks to his health or safety and any additional accessory designed to meet that objective.
Personal Protective Equipment (P.P.E) As Last Resort

- Personal Protective Equipment (PPE) must be provided when necessary by reason of hazards encountered that are capable of causing injury or impairment.

- Use of PPE does not eliminate the hazard, so if the equipment fails then exposure occurs.
Definition of Hazards:

Any condition or act with the potential to cause harm – injury, ill health, damage to property or environment & etc.
Potential Route of Entry

- Inhalation
- Skin Contact
- Ingestion
- Eyes
- Hearing
The PPE selection basis should be based on the type of hazard the worker is exposed

- **MECHANICAL**
  - Puncture, Cut, Abrasive object (mechanical), Moving machinery

- **CHEMICAL**
  - Corrosive, Irritant, Carcinogen, Poison

- **PHYSICAL**
  - Noise, Radiation, Extreme temperature, Vibration, Electrical

- **BIOLOGICAL**
  - Bacterial, Parasitic, Virus
Types of Personal Protective Equipment (P.P.E)

- Head Protection
- Eye & Face Protection
- **Hand & Arm Protection**
- Respiratory Protection
- Hearing Protection
- Foot Protection
- Body Protection
Hand Protection
Hand Hazards

Can largely be grouped into 5 types:

- Chemical
- Thermal
- Mechanical
- Biological
- Electrical
Types of Gloves

- Chemical Resistance
- General Purpose
- Special Application
Consideration when selecting gloves:

- Application of glove
- Material
- Length
- Size
- Cuff Types
- Dexterity & Comfort
- Meet approved Standards
Chemical Hazards

Dermatitis

Alkaline

Solvent
Chemical Resistant Gloves

Natural Rubber  Neoprene  Nitrile  PVA

Butyl  PVC  VITON
### Chemical Gloves Selection Chart

#### Permeation/Degradation Resistance Guide for Ansell Gloves

The first square in each column for each glove type is color coded. This is an easy-to-read indication of how we rate this type of glove in relation to its applicability for each chemical listed. The color represents an overall rating for both degradation and permeation. The letter in each square is for Degradation alone...

- **GREEN**: The glove is very well suited for application with that chemical.
- **YELLOW**: The glove is suitable for that application under careful control of its use.
- **RED**: Avoid use of the glove with this chemical.

#### Table

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Acetaldehyde</th>
<th>Acetic Acid</th>
<th>Acetone</th>
<th>Acetonitrile</th>
<th>Acrylic Acid</th>
<th>Acrylonitrile</th>
<th>Allyl Alcohol</th>
<th>Ammonia Gas</th>
<th>Ammonium Fluoride, 40%</th>
<th>Ammonium Hydroxide</th>
<th>Amyl Acetate</th>
<th>Amyl Alcohol</th>
<th>Aniline</th>
<th>Aqua Regia</th>
<th>Benzaldehyde</th>
<th>Benzene, Benzoil</th>
<th>Benzoichloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degradation Rating</td>
<td>380 E</td>
<td>150 -</td>
<td>▲ &gt;480 E</td>
<td>▲ &gt;480 E</td>
<td>-</td>
<td>E &gt;480 E</td>
<td>▲ 19 E</td>
<td>▲ &gt;480</td>
<td>-</td>
<td>E 30</td>
<td>▲ &gt;480 E</td>
<td>-</td>
<td>▲ &gt;480</td>
<td>E &gt;480</td>
<td>E &gt;480</td>
<td>▲ &gt;480</td>
<td>E &gt;480</td>
</tr>
<tr>
<td>Permeation: Breakthrough</td>
<td>P</td>
<td>G</td>
<td>F</td>
<td>G</td>
<td>-</td>
<td>-</td>
<td>▲</td>
<td>▲</td>
<td>-</td>
<td>E</td>
<td>F</td>
<td>-</td>
<td>NR</td>
<td>G</td>
<td>E</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Permeation: Degradation Rate</td>
<td>10 F</td>
<td>60</td>
<td>10 F</td>
<td>20 G</td>
<td>390</td>
<td>-</td>
<td>-</td>
<td>140</td>
<td>-</td>
<td>290</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>P</td>
<td>100</td>
<td>120</td>
<td>290</td>
</tr>
<tr>
<td>Meet approved Standards</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>E</td>
<td>G</td>
<td>P</td>
<td>-</td>
<td>G</td>
<td>E</td>
<td>NR</td>
<td>NR</td>
<td>G</td>
<td>F</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

How to Read the Charts

Three categories of data are represented for each Ansell product and corresponding chemical: 1) overall degradation resistance rating; 2) permeation breakthrough time, and 3) permeation rate.

Standards for Color-Coding

A glove-chemical combination receives GREEN if either set of the following conditions is met:
- The degradation rating is Excellent or Good
- The permeation breakthrough time is 30 minutes or longer
- The permeation rate is Excellent, Very Good, or Good.

OR
- The permeation rate is not specified
- The permeation breakthrough time is 240 minutes or longer
- The degradation rating is Excellent, Very Good, or Good

A glove-chemical combination receives RED if the degradation rating is Poor or Not Recommended, regardless of the permeation rating.

All other glove-chemical combinations receive YELLOW. In other words, any glove-chemical combination not meeting either set of conditions required for Green, and not having a Red degradation rating of either Poor or Not Recommended, receives a YELLOW rating.

### Key to Permeation Rate

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Permeation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Excellent; permeation rate of less than 0.9 µg/cm²/min.</td>
<td>0 to 1/2 drop</td>
</tr>
<tr>
<td>VG</td>
<td>Very Good; permeation rate of less than 9 µg/cm²/min.</td>
<td>1 to 5 drops</td>
</tr>
<tr>
<td>G</td>
<td>Good; permeation rate of less than 90 µg/cm²/min.</td>
<td>6 to 50 drops</td>
</tr>
<tr>
<td>F</td>
<td>Fair; permeation rate of less than 900 µg/cm²/min.</td>
<td>51 to 500 drops</td>
</tr>
<tr>
<td>P</td>
<td>Poor; permeation rate of less than 9000 µg/cm²/min.</td>
<td>501 to 5000 drops</td>
</tr>
<tr>
<td>NR</td>
<td>Not Recommended; permeation rate greater than 9000 µg/cm²/min.</td>
<td>5001 drops up</td>
</tr>
</tbody>
</table>

Note: The current revision to the ASTM standard permeation test calls for permeation to be reported in micrograms of chemical per square centimeter of material exposed per minute of exposure, "µg/cm²/min."

### Key to Permeation Breakthrough

<table>
<thead>
<tr>
<th>Condition</th>
<th>Breakthrough Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Greater than (time)</td>
</tr>
<tr>
<td>VG</td>
<td>Less than (time)</td>
</tr>
</tbody>
</table>

### Key to Degradation Ratings

- E—Excellent; fluid has very little degrading effect.
- G—Good; fluid has minor degrading effect.
- F—Fair; fluid has moderate degrading effect.
- P—Poor; fluid has pronounced degrading effect.
- NR—Fluid was not tested against this material.

NOTE: Any test samples rated P (poor) or NR (not recommended) in degradation testing were not tested for permeation resistance. A dash (—) appears in those cases.

### Specific Gloves Used for Testing

<table>
<thead>
<tr>
<th>Degradation</th>
<th>Permeation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrile</td>
<td>Sol-Vex* 37-145 (11 mil/0.28 mm)</td>
</tr>
<tr>
<td>Neoprene Unsupported</td>
<td>29-865 (18 mil/0.46 mm)</td>
</tr>
<tr>
<td>Polyvinyl Alcohol Supported</td>
<td>PVA™</td>
</tr>
<tr>
<td>Polyvinyl Chloride Supported</td>
<td>Snorkel*</td>
</tr>
<tr>
<td>Natural Rubber Latex</td>
<td>Cannons 392 (19 mil/0.48 mm)</td>
</tr>
<tr>
<td>Neoprene/Latex Blend</td>
<td>Chemi-Pro 224 (27 mil/0.67 mm)</td>
</tr>
<tr>
<td>Laminated LCP™ Film</td>
<td>Barrier 2-100 (2.5 mil/0.06 mm)</td>
</tr>
</tbody>
</table>

Single palm thickness is listed in both mil and metric millimeter (mm) for Unsupported Gloves. Supported Gloves are specified by glove weight, not thickness.
Link to Chemical Resistance Gloves Selection:


file:///C:/Users/User/Downloads/2640.pdf
Care & Maintenance of Gloves

- Wash gloves daily after contact with Chemicals
- Store at ambient temperature away from light, moisture, solvent and chemicals.
- Issue glove on a personal basis
- Inspect for cuts, abrasions, cracks, contamination etc.
When to change a Gloves?

- Torn
- Degraded
- Dirty
- Permeation
Any Question
Thank You

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