PPE'S SUPPLY · 31

Hand Protection

Hand and arm protection enquiries across a range of workplace exposures and tasks.

Hand Protection: Personal Protective Equipment Hand and Arm Protection

Potential hazards to hands and arms include skin absorption of chemical or biological hazards, chemical or thermal burns, electric shock, bruises, abrasions, cuts, punctures, fractures, or amputations. Protective equipment includes gloves, finger guards, and arm coverings.

Selection must be based on the performance characteristics of the glove in relation to the tasks to be performed. Suppliers and manufacturers may provide compliance guidelines or references for food and pharmaceutical applications.

Hand And Arm Hazards

- Abrasion
- Amputations
- Cuts
- Bloodborne Pathogens
- Biological
- Chemicals (Dry or Liquid)
- Chemical Burns (Acid or Base)
- Electrical Shock
- Extreme Temperatures
- Fractures
- Laceration
- Heat and Cold
- Thermal Burns
- Radiation
- Vibration and Grip

Hand and Arm Protection Hazards

Working with harmful substances	Such as strong acids/bases, toxic or corrosive materials, organic solvents, and radioactive materials, which can be absorbed through the skin, or cause skin irritation, chemical burns, or similar conditions.
Working with tools, equipment, or materials	That can cause cuts, lacerations, punctures, fractures, amputations, or abrasions.
Work involving exposure to harmful temperatures	Such as thermal burns or exposure to extreme heat or cold.
Work involving exposure to bloodborne pathogens	Or other potentially infectious agents.
Work on live electrical systems or components	Additional training is required for the use of electrical protective equipment.

Types of Hand & Arm Protection

DISPOSABLE GLOVES

Best for one-time use situations. Provides minimal protection against materials or protects the material from the handler. Available in a variety of materials and for a variety of tasks. Disposable gloves are typically very thin and provide improved sensitivity and dexterity. However, they may tear or puncture easily and are less chemical resistant than standard chemical resistant gloves. Avoid using disposable gloves for processes involving intentional direct chemical contact.

CRITICAL-ENVIRONMENT GLOVES

Used in applications that require extreme cleanliness, such as in the electronic, nuclear, and pharmaceutical industries.

CHEMICAL-RESISTANT GLOVES

Protects against specific chemicals and liquids, also providing minimal protection against abrasion, cuts, punctures, and snags. Generally, any “chemical-resistant” glove can be used for dry powders.

General-Purpose Gloves

Intended to help reduce hand injuries from snags, punctures, abrasions, and cuts.

Coated Gloves

Nitrile and natural rubber coated gloves are often used as substitutes for leather gloves. Offer superior hand protection in wet environments where dexterity is important. However, coated gloves provide minimal protection from physical hazards such as cuts, abrasions, or punctures.

CUT-RESISTANT GLOVES

Available in a wide variety of materials, including metal-mesh, Kevlar®, and aluminized and other cut-resistant materials. Protects against cuts and scrapes caused by knives and other sharp tools and equipment. Cut-resistant gloves are rated according to the level of force required to cut the material.

PUNCTURE-RESISTANT GLOVES

Available in a wide variety of materials. Protects against most sharp objects, including glass, metal, and needle sticks. No glove is completely puncture-proof. Puncture-resistant gloves are rated according to the level of force required to puncture the material.

ANTI-VIBRATION/IMPACT GLOVES

Protection from vibration or impact from tools and equipment. Helps prevent hand, finger, and arm fatigue.

LEATHER GLOVES

Qualities of leather include comfort, durability, dexterity, mild heat resistance, and abrasion resistance. Good all-purpose glove.

TEMPERATURE-RESISTANT GLOVES

Provides protection from high or low temperatures. Common materials used include leather, Kevlar®, cotton, terrycloth, cryogenic gloves, rubber, Nomex®, Zetex®, and Flextra®. Select gloves based on the type of heat or cold source (fire, radiant heat, hot or cold object, hot or cold liquids, etc.). Some temperature-resistant gloves may protect against hot or cold objects but not against hot or cold gases or liquids.

ELECTRICAL GLOVES

- Voltage-rated gloves provided protection against shock hazards.
- See Shock Protective PPE
- See Arc Flash Protective Equipment
- Arc Rated PPE Category & Boundaries For AC Systems
- Arc Rated PPE Category & Boundaries For DC Systems

Glove Selection

The best place to start when selecting gloves for a task is to compare the exposure hazards to the protective qualities of the gloves available from your supplier. Many tasks will involve multiple hazards, and the glove selected should either protect against all of the hazards, or more than one type of glove may have to be worn.

A common example of this is when leather gloves (cut/puncture/abrasion resistant) are worn over voltage-rated rubber gloves. Certain chemical and/or radiation hazards may require double gloving (of the same type).

Before purchasing gloves, review the work activities to determine the degree of dexterity required, the duration, frequency, and degree of exposure to the hazard, and the physical stresses that will be applied. There are several factors to consider when selecting a glove, such as size, the type of cuff, lining, and length.

Sizing

Gloves come in sizes ranging from small to XX-large. It is important to provide a selection of sizes to employees so that a proper fit is obtained. Gloves that are too small will cause fatigue and gloves that are too large may create dexterity issues or entanglement hazards. Improperly sized gloves may affect the protective qualities.

Cuff Type

Pinked cuff – A zigzag finished appearance commonly found on knit-lined rubber gloves. Rolled cuff – Gives additional cuff strength and a finished appearance. Acts as a barrier to keep chemicals from running off the glove and onto the skin. Straight cuff – Provides a snug fit to protect from chemical runoff and skin contact. Gauntlet cuff – Extended length protects the wrist area. Slides on and off easily. Allows for maximum movement of the forearm.

Lining Type

Unlined – Gives better sensitivity and dexterity than lined gloves. Required where particle contamination is a concern. Powdered unlined gloves make donning on/off easier and can increase comfort, but may be an irritant, or a sensitizer, to some individual users. Flock-lined – Shredded fiber, usually cotton, applied to the inside surface of the glove material. Absorbs perspiration. Easy to take on and off.

Knit-lined – Cotton or synthetic material bonded to the inside surface of a glove. Absorbs perspiration, adds some temperature protection. Jersey-lined – Softest, most comfortable lining. Gives additional temperature protection and greater cushioning effect.

Length

- Finger cots – worn on the fingers alone when minimal or no protection is required.
- 9 – 12 inches provides complete hand protection.
- 12 – 18 inches provides hand, forearm to elbow protection for immersion or extra splash protection.
- 24 – 31 inches provides full arm immersion protection.

Chemical Resistant Gloves Selection

Chemical-resistant glove selection begins with an evaluation of the type of work to be performed and the chemical(s) that personnel will be contacting. No glove provides protection against all potential chemical hazards, and available gloves may provide only limited protection against many chemicals. It is important, therefore, to select the most appropriate glove for a particular application and to determine how long it can be worn and whether it can be reused.

Considerations for Glove Selection

The type of chemical(s) to be handled or used. Glove selection guidance is provided for some chemicals by the following manufacturers.

Ansell Glove Selection Database.

Reusable Glove Chart from North by Honeywell.

Contact for additional questions.

The toxic properties of the chemical(s) – in particular, chemicals that can cause local effects on the skin and/or pass through the skin and cause systemic effects, may warrant a higher level of protection.

The frequency and duration of the task for chemical contact. Different chemicals will affect the protective qualities of a glove in different ways.

Breakthrough time: the time it takes for the chemical to pass to the inside of the glove. This is a characteristic of the glove material. Some glove materials are not recommended for certain chemicals. Some materials indicate a time limit before chemical breakthrough of the glove material was detected. Some materials do not have a detectable chemical breakthrough (under laboratory test conditions). Follow manufacturer guidelines or supplier “Chemical Compatibility Guides” for additional information.

Permeation: if a chemical will pass through a glove material.

Degradation: how the chemical will affect the physical properties of the glove material upon contact. Degradation can lead to softening, drying, swelling, shrinkage, increased brittleness, or other undesirable side effects that could allow permeation or breakthrough inside the glove.

The ability of the chemical to penetrate through the glove must be determined.

Latex or natural rubber does not hold up well to organic solvents, oils, greases, or fuels such as kerosene or gasoline.

Nitrile is ideal for stripping and degreasing, chemical washing, and is resistant to animal fats and vegetable oils. Nitrile does not contain latex that causes skin allergies.

Polyvinyl chloride (PVC) provides excellent resistance to most acids, fats, and petroleum hydrocarbons.

Neoprene is strong and durable and provides excellent chemical resistance. Note: Check “Chemical Compatibility Guides” for specific chemical and glove materials recommended.

Polyvinyl alcohol (PVA) has an extremely high resistance to aliphatics, aromatics, chlorinated solvents, esters, and ketones. PVA quickly breaks down when exposed to water and light alcohols.

Butyl provides excellent chemical resistance to gases and ketones. It is ideal for handling hazardous materials. Butyl is severely affected by fuels and aliphatic and aromatic hydrocarbon solvents.

Viton is the most resistant of all, and provides high-temperature, fuel-resistance. Recommended for working with extremely hazardous chemicals, such as carcinogenic or highly toxic chemicals.

Silver-shield provides excellent chemical resistance and is commonly used for hazardous materials work, or work involving multiple chemical hazards.

Mixtures and formulated products (unless specific test data is available) require that gloves should be selected based on the chemical component with the shortest breakthrough time since it’s possible for solvents to carry active ingredients through some glove materials.

Personnel must be trained on safe ways to remove gloves to prevent contamination.

Determine if the task will involve splash hazards, and ensure that adequate protection is used.

Consider the concentration of the chemical(s).

Consider the temperature of the chemical(s).

Consider abrasion, cut, puncture, tear-resistance, and grip requirements.

For work involving chemicals where there is a skin absorption hazard, double gloving of the appropriate type may be necessary.

Gloves, whether lined or unlined, can confine perspiration and high humidity inside the gloves, leading to skin irritation and dermatitis. Dry the hands thoroughly between use of gloves.

FAQ

Q. What hazards can hands and arms face at work?

Chemical or biological absorption, chemical and thermal burns, electric shock, cuts, punctures, abrasions, fractures, amputations, extreme temperatures, radiation and vibration.

Q. How should gloves be selected?

On the glove's performance characteristics in relation to the task to be performed. Suppliers may provide compliance guidance for food and pharmaceutical use.

Q. When should disposable gloves not be used?

For processes involving intentional direct chemical contact. They are thin and less chemical-resistant than standard chemical-resistant gloves.

Q. What are critical-environment gloves for?

Applications that need extreme cleanliness, such as the electronics, nuclear and pharmaceutical industries.

Q. Is extra training needed for electrical work?

Yes. Work on live electrical systems requires additional training in the use of electrical protective equipment.

Useful details to share when you enquire

- Tasks, workplace hazards and product specifications
- Required quantities and wearer sizes
- Existing equipment and compatibility needs

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