



Appendix A Personal Protective Equipment Selection

General Guidelines for Choosing Personal Protective Equipment

1. Description and Use of Eye/Face Protectors

- a. **Safety Glasses.** Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Safety glasses are also available in prescription form for those persons who need corrective lenses.
- b. **Single Lens Goggles.** Vinyl framed goggles of soft pliable body design provide adequate eye protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.
- c. **Welders/Chippers Goggles.** These goggles are available in rigid and soft frames to accommodate single or two eyepiece lenses.
 1. Welders goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.
 2. Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eye cups house impact resistant clear lenses with individual cover plates.
- d. **Face Shields.** These normally consist of an adjustable headgear and face shield of tinted/transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance and light ray filtering capacity. Face shields will be used in operations when the entire face needs protection and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.
- e. **Welding Shields.** These shield assemblies consist of vulcanized fiber or glass fiber body, a ratchet/button type adjustable headgear or cap attachment and a filter and cover plate holder. These shields will be provided to protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations.

2. Head Protection

Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object. Head protectors, in the form of protective hats, must resist penetration and absorb the shock of a blow. The shell of the protective hat is hard enough to resist the blow and the headband and crown straps keep the shell away from the wearer's skull. Protective hats can also protect against electrical shock.

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Eye and Face Protection Selection Chart		
Source	Assessment of Hazard	Protection
IMPACT - Chipping, grinding, machining, drilling, chiseling, riveting, sanding, etc.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	Spectacles with side protection, goggles, face shields. For severe exposure, use face shield over primary eye protection.
CHEMICALS - Acid and chemicals handling	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield over primary eye protection
	Irritating mists	Special-purpose goggles
DUST - Woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types.
LIGHT and/or RADIATION Welding - electric arc Welding - gas Cutting, torch brazing, torch soldering Glare	Optical radiation	Welding helmets or welding shields. Typical shades: 10-14
	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4
	Optical radiation	Spectacles or welding face shield. Typical shades: 1.5-3
	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable.

Protective hats are made in the following types and classes:

- Type I - Helmets with a full brim.
- Type 2 - Brimless helmets with a peak extending forward from the crown.
- Class A - General service, limited voltage. Intended for protection against impact hazards. Used in mining, construction, and manufacturing.
- Class B - Utility service, high voltage. Used by electrical workers.
- Class C - Special service, no voltage protection. Designed for lightweight comfort and impact protection. Used in certain construction, manufacturing, refineries, and where there is a possibility of bumping the head against a fixed object.

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3. Foot Protection

There are many types and styles of protective footwear and it's important to realize that a particular job may require additional protection other than listed here. Footwear that meets established safety standards will have an American National Standards Institute (ANSI) label inside each shoe.

- a. **Steel-Reinforced Safety Shoes.** These shoes are designed to protect feet from common machinery hazards such as falling or rolling objects, cuts, and punctures. The entire toe box and insole are reinforced with steel, and the instep is protected by steel, aluminum, or plastic materials. Safety shoes are also designed to insulate against temperature extremes and may be equipped with special soles to guard against slip, chemicals, and/or electrical hazards.
- b. **Safety Boots.** Safety boots offer more protection when splash or spark hazards (chemicals, molten materials) are present:
 - o When working with corrosives, caustics, cutting oils, and petroleum products, neoprene or nitrile boots are often required to prevent penetration.
 - o Foundry or "Gaiter" style boots feature quick-release fasteners or elasticized insets to allow speedy removal should any hazardous substances get into the boot itself.
 - o When working with electricity, special electrical hazard boots are available and are designed with no conductive materials other than the steel toe (which is properly insulated).

4. Hand Protection

Skin contact is a potential source of exposure to toxic materials; it is important that the proper steps be taken to prevent such contact. Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or any combination thereof.

Gloves should be replaced periodically, depending on frequency of use and permeability to the substance(s) handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.

Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects, and very hot or very cold materials. The type of glove materials to be used in these situations include leather, welder's gloves, aluminum-backed gloves, and other types of insulated glove materials.

Careful attention must be given to protecting your hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts. To protect hands from injury due to contact with moving parts, it is important to:

- Ensure that guards are always in place and used.
- Always lock-out machines or tools and disconnect the power before making repairs.
- Treat a machine without a guard as inoperative; and

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- Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

The following is a guide to the most common types of protective work gloves and the types of hazards they can guard against:

- Disposable Gloves.** Disposable gloves, usually made of light-weight plastic, can help guard against mild irritants.
- Fabric Gloves.** Made of cotton or fabric blends are generally used to improve grip when handling slippery objects. They also help insulate hands from mild heat or cold.
- Leather Gloves.** These gloves are used to guard against injuries from sparks or scraping against rough surfaces. They are also used in combination with an insulated liner when working with electricity.
- Metal Mesh Gloves.** These gloves are used to protect hands from accidental cuts and scratches. They are used most commonly by persons working with cutting tools or other sharp instruments.
- Aluminized Gloves.** Gloves made of aluminized fabric are designed to insulate hands from intense heat. These gloves are most commonly used by persons working molten materials.
- Chemical Resistance Gloves.** These gloves may be made of rubber, neoprene, polyvinyl alcohol or vinyl, etc. The gloves protect hands from corrosives, oils, and solvents. The following table is provided as a guide to the different types of glove materials and the chemicals they can be used against. When selecting chemical resistance gloves, be sure to consult the manufacturers' recommendations, especially if the gloved hand will be immersed in the chemical.

Glove Chart

Type	Advantages	Disadvantages	Use Against
Natural rubber	Low cost, good physical properties, dexterity	Poor vs. oils, greases, organics. Frequently imported; may be poor quality	Bases, alcohols, dilute water solutions; fair vs. aldehydes, ketones.
Natural rubber blends	Low cost, dexterity, better chemical resistance than natural rubber vs. some chemicals	Physical properties frequently inferior to natural rubber	Same as natural rubber
Polyvinyl chloride (PVC)	Low cost, very good physical properties, medium cost, medium chemical resistance	Plasticizers can be stripped; frequently imported may be poor quality	Strong acids and bases, salts, other water solutions, alcohols
Neoprene	Medium cost, medium chemical resistance, medium physical properties	NA	Oxidizing acids, anilines, phenol, glycol ethers

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Nitrile	Low cost, excellent physical properties, dexterity	Poor vs. benzene, methylene chloride, trichloroethylene, many ketones	Oils, greases, aliphatic chemicals, xylene, perchloroethylene, trichloroethane; fair vs. toluene
Butyl	Speciality glove, polar organics	Expensive, poor vs. hydrocarbons, chlorinated solvents	Glycol ethers, ketones, esters
Polyvinyl alcohol (PVA)	Specialty glove, resists a very broad range of organics, good physical properties	Very expensive, water sensitive, poor vs. light alcohols	Aliphatics, aromatics, chlorinated solvents, ketones (except acetone), esters, ethers
Fluoro-elastomer (Viton)™*	Specialty glove, organic solvents	Extremely expensive, poor physical properties, poor vs. some ketones, esters, amines	Aromatics, chlorinated solvents, also aliphatics and alcohols
Norfoil (Silver Shield)	Excellent chemical resistance	Poor fit, easily punctures, poor grip, stiff	Use for Hazmat work

*Trademark of DuPont Dow Elastomers

Glove Type and Chemical Use

*Limited service	VG= Very Good	G= Good	F=Fair	P=Poor (not recommended)
Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile Latex
*Acetaldehyde	VG	G	VG	G
Acetic acid	VG	VG	VG	VG
*Acetone	G	VG	VG	P
Ammonium hydroxide	VG	VG	VG	VG
*Amyl acetate	F	P	F	P
Aniline	G	F	F	P
*Benzaldehyde	F	F	G	G

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Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile
*Benzene	F	F	F	P
Butyl acetate	G	F	F	P
Butyl alcohol	VG	VG	VG	VG
Carbon disulfide	F	F	F	F
*Carbon tetrachloride	F	P	P	G
Castor oil	F	P	F	VG
*Chlorobenzene	F	P	F	P
*Chloroform	G	P	P	P
Chloronaphthalene	F	P	F	F
Chromic Acid (50%)	F	P	F	F
Citric acid (10%)	VG	VG	VG	VG
Cyclohexanol	G	F	G	VG
*Dibutyl phthalate	G	P	G	G
Diesel fuel	G	P	P	VG
Diisobutyl ketone	P	F	G	P
Dimethylformamide	F	F	G	G
Diocetyl phthalate	G	P	F	VG
Dioxane	VG	G	G	G
Epoxy resins, dry	VG	VG	VG	VG
*Ethyl acetate	G	F	G	F
Ethyl alcohol	VG	VG	VG	VG
Ethyl ether	VG	G	VG	G
*Ethylene dichloride	F	P	F	P
Ethylene glycol	VG	VG	VG	VG
Formaldehyde	VG	VG	VG	VG
Formic acid	VG	VG	VG	VG
Freon 11	G	P	F	G
Freon 12	G	P	F	G
Freon 21	G	P	F	G
Freon 22	G	P	F	G

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Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile
*Furfural	G	G	G	G
Gasoline, leaded	G	P	F	VG
Gasoline, unleaded	G	P	F	VG
Glycerine	VG	VG	VG	VG
Hexane	F	P	P	G
Hydrochloric acid	VG	G	G	G
Hydrofluoric acid (48%)	VG	G	G	G
Hydrogen peroxide (30%)	G	G	G	G
Hydroquinone	G	G	G	F
Isooctane	F	P	P	VG
Isopropyl alcohol	VG	VG	VG	VG
Kerosene	VG	F	F	VG
Ketones	G	VG	VG	P
Lacquer thinners	G	F	F	P
Lactic acid (85%)	VG	VG	VG	VG
Lauric acid (36%)	VG	F	VG	VG
Lineoleic acid	VG	P	F	G
Linseed oil	VG	P	F	VG
Maleic acid	VG	VG	VG	VG
Methyl alcohol	VG	VG	VG	VG
Methylamine	F	F	G	G
Methyl bromide	G	F	G	F
*Methyl chloride	P	P	P	P
*Methyl ethyl ketone	G	G	VG	P
*Methyl isobutyl ketone	F	F	VG	P
Methyl methacrylate	G	G	VG	F
Monoethanolamine	VG	G	VG	VG
Morpholine	VG	VG	VG	G
Naphthalene	G	F	F	G
Naphthas, aliphatic	VG	F	F	VG

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Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile
Naphthas, aromatic	G	P	P	G
*Nitric acid	G	F	F	F
Nitromethane (95.5%)	F	P	F	F
Nitropropane (95.5%)	F	P	F	F
Octyl alcohol	VG	VG	VG	VG
Oleic acid	VG	F	G	VG
Oxalic acid	VG	VG	VG	VG
Palmitic acid	VG	VG	VG	VG
Perchloric acid (60%)	VG	F	G	G
Perchloroethylene	F	P	P	G
Petroleum distillates (naphtha)	G	P	P	VG
Phenol	VG	F	G	F
Phosphoric acid	VG	G	VG	VG
Potassium hydroxide	VG	VG	VG	VG
Propyl acetate	G	F	G	F
Propyl alcohol	VG	VG	VG	VG
Propyl alcohol (iso)	VG	VG	VG	VG
Sodium hydroxide	VG	VG	VG	VG
Styrene	P	P	P	F
Stryene (100%)	P	P	P	F
Sulfuric acid	G	G	G	G
Tannic acid (65%)	VG	VG	VG	VG
Tetrahydrofuran	P	F	F	F
*Toluene	F	P	P	F
Toluene diisocyanate	F	G	G	F
*Trichloroethylene	F	F	P	G
Triethanolamine	VG	G	G	VG
Tung oil	VG	P	F	VG
Turpentine	G	F	F	VG
*Xylene	P	P	P	F

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Hazard Assessment Certification Form

Date:	Location:
Assessment Conducted By:	
Specific Tasks Performed at this Location:	

Hazard Assessment and Selection of Personal Protective Equipment

I. Overhead Hazards -

- Hazards to consider include:
- Suspended loads that could fall
- Overhead beams or loads that could be hit against
- Energized wires or equipment that could be hit against
- Employees work at elevated site who could drop objects on others below
- Sharp objects or corners at head level

Hazards Identified:

Head Protection

Hard Hat:	Yes	No
If yes, type:		
<ul style="list-style-type: none">○ Type A (impact and penetration resistance, plus low-voltage electrical insulation)○ Type B (impact and penetration resistance, plus high-voltage electrical insulation)○ Type C (impact and penetration resistance)		

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II. Eye and Face Hazards -

- Hazards to consider include:
- Chemical splashes
- Dust
- Smoke and fumes
- Welding operations
- Lasers/optical radiation
- Bioaerosols
- Projectiles

Hazards Identified:

Eye Protection

Safety glasses or goggles	Yes	No
Face shield	Yes	No

III. Hand Hazards -

- Hazards to consider include:
- Chemicals
- Sharp edges, splinters, etc.
- Temperature extremes
- Biological agents
- Exposed electrical wires
- Sharp tools, machine parts, etc.
- Material handling

Hazards Identified:

Hand Protection

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Gloves	Yes	No
<ul style="list-style-type: none"> ○ Chemical resistant ○ Temperature resistant ○ Abrasion resistant ○ Other (Explain) 		

IV. Foot Hazards -

- Hazards to consider include:
- Heavy materials handled by employees
- Sharp edges or points (puncture risk)
- Exposed electrical wires
- Unusually slippery conditions
- Wet conditions
- Construction/demolition

Hazards Identified:

Foot Protection

Safety shoes	Yes	No
Types: <ul style="list-style-type: none"> ○ Toe protection ○ Metatarsal protection ○ Puncture resistant ○ Electrical insulation ○ Other (Explain) 		

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V. Other Identified Safety and/or Health Hazards:

Hazard	Recommended Protection

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on _____.

(Signature)