

Guideline to Selection of Personal Protective Equipment

	contain sharp objects, work with a sharp blade		
	Work with live, exposed circuitry above 50V	<input type="checkbox"/> Electric Shock	<input type="checkbox"/> Hardhat, Type <input type="checkbox"/> E (impact/high volt) – for 600V or more <input type="checkbox"/> Gloves <input type="checkbox"/> Electrical, insulating – Use appropriate class for voltage <input type="checkbox"/> Safety shoes, insulating <input type="checkbox"/> Garments/Other – insulating sleeve, blankets and mats
	Work with extremely hot or cold materials or surfaces such as pipes, crucibles, glass, metal	<input type="checkbox"/> Burn, contact with hot or freezing surfaces	<input type="checkbox"/> Gloves <input type="checkbox"/> Heat – Leather, aluminized, Kevlar, Zetex, Cryogenic, or other temperature resistant material. Note: Always verify that manufacturer's specifications are suitable for the task.
	Work with molten materials	<input type="checkbox"/> Burn	<input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Face shield <input type="checkbox"/> Gloves <input type="checkbox"/> Heat – Leather, aluminized, Kevlar, Zetex or other heat resistant material. Always verify that manufacturer's specifications are suitable for the task. <input type="checkbox"/> Safety shoes – where molten material may spill on the foot <input type="checkbox"/> Garments/Other – Rubber apron
	Welding, laser operations	<input type="checkbox"/> Light/Radiation <input type="checkbox"/> Ultraviolet and Infrared Radiation <input type="checkbox"/> Metal fume/Welding gases <input type="checkbox"/> Electric Current <input type="checkbox"/> Hot Metal <input type="checkbox"/> Noise	<input type="checkbox"/> Welder's goggles or helmet. Be sure to use the appropriate optical density for the welding being done. <input type="checkbox"/> Protective Clothing - Leather <input type="checkbox"/> Laser eyewear – use the appropriate type for the wavelength and the necessary optical density. Ensure that the eyewear manufacturer's specifications are suitable for the task. Contact EH&S for assistance.
	Hazardous material handling, chemical/hazardous material mixing, chemical laboratory operations, bonding, plating, chemical cleaning, applying adhesives, resins, or epoxies, spray coating, maintenance work in hazardous material use areas	<input type="checkbox"/> Chemical overexposure	<input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant – Verify that the glove manufacturer's specifications are suitable for the material and the task. <input type="checkbox"/> Respirator – Contact EH&S for assistance.
	Hazardous material handling, chemical/hazardous material mixing, chemical laboratory operations, bonding, plating, chemical cleaning, applying adhesives, resins, or epoxies, spray coating, maintenance work in hazardous material use areas	<input type="checkbox"/> Chemical splash/contact	<input type="checkbox"/> Goggles: <input type="checkbox"/> Chemical splash type <input type="checkbox"/> Face shield – If a significant facial skin hazard is present (e.g. a corrosive or hot substance), use a face shield over chemical goggles <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant – Verify that the glove manufacturer's specifications are suitable for the material and the task. <input type="checkbox"/> Closed-toed shoes <input type="checkbox"/> Respirator – Contact EH&S for assistance. <input type="checkbox"/> Garments/Other – A lab coat where incidental contact is possible or a rubber or neoprene lab apron if a hazardous chemical splash may occur.
	Acid cleaning	<input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand	<input type="checkbox"/> Chemical Splash Goggles <input type="checkbox"/> Face shield

Guideline to Selection of Personal Protective Equipment

	<input type="checkbox"/> Chemical Mineral acids, acid pastes Remarks: Be especially cautious with products containing hydrofluoric acid (HF). Consult the EHS Procedure for Hydrofluoric Acid Safety and the MSDS.	<input checked="" type="checkbox"/> Chemical Resistant Gloves Remarks: Refer to the last page of this guide for assistance in selecting chemical resistant gloves. Verify that the glove manufacturer's specifications are suitable for the material and the task. Where ventilation is not sufficient, contact EH&S. If a respirator is needed, contact EH&S for assistance. Respiratory use requires medical monitoring, training, and fit testing.
Bonding	<input type="checkbox"/> Chemical - Epoxy adhesives	<input type="checkbox"/> Gloves Remarks: Refer to the last page of this guide for assistance in selecting chemical resistant gloves. Verify that the glove manufacturer's specifications are suitable for the material and the task.
Laboratory chemical manipulation, Various chemical reagents	<input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Chemical	<input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Chemical Splash Goggles <input type="checkbox"/> Face shield <input type="checkbox"/> Chemical Resistant Gloves - See remarks below Remarks: Refer to the last page of this guide for assistance in selecting chemical resistant gloves. Verify that the glove manufacturer's specifications are suitable for the material and the task. Use chemical splash goggles and face shield where there is a possibility of a chemical splash, e.g. pouring liquid corrosives. Where ventilation is not sufficient, contact EH&S for assistance. If a respirator is needed, contact EH&S for assistance. Respiratory use requires medical monitoring, training, and fit testing.
Chemical cleaning	<input type="checkbox"/> Head <input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Inhalation <input type="checkbox"/> Chemical – Organic solvents, e.g. acetone, isopropyl alcohol, methanol, methyl ethyl ketone; Acids, e.g. nitric acid, hydrochloric acid, hydrofluoric acid Remarks: Refer to MSDSs	<input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Chemical Splash Goggles – if cleaning with large quantities where a chemical splash hazard is present <input type="checkbox"/> Face shield – if cleaning with corrosives where a severe splash hazard is present <input type="checkbox"/> Chemical Resistant Gloves – Refer to the last page of this guide for assistance in selecting chemical resistant gloves. Verify that the glove manufacturer's specifications are suitable for the material and the task. <input type="checkbox"/> Respirator – Contact EH&S for assistance. <input type="checkbox"/> Garments/Other – Use a lab coat, or use rubber or neoprene apron if a significant splash hazard is present. Remarks: Respirators and protective clothing are generally not required but may be necessary if large volumes of solvents or acids are used. Contact EH&S for assistance.
Laser/Ultraviolet Light Operations	<input type="checkbox"/> Electric Shock <input type="checkbox"/> Heat/Burn <input type="checkbox"/> Light/Radiation (UV Light) <input type="checkbox"/> Chemical - Refer to MSDSs if chemical dyes are used	<input type="checkbox"/> Laser eyewear (specify λ , OD) <input type="checkbox"/> Chemical resistant gloves – Refer to MSDS for laser dye, if necessary. Remarks: Use laser eyewear appropriate for laser and consistent with laser training.
Mechanical assembly	Remarks: No general PPE-related hazards noted	Remarks: None

Guideline to Selection of Personal Protective Equipment

	<p>Metalworking/machining</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Flying Objects <input type="checkbox"/> Puncture <input type="checkbox"/> Chemical – Metalworking fluids</p> <p>Remarks: Metalworking fluid hazards include cancer, breathing and skin problems. Refer to the MSDSs.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Gloves <input type="checkbox"/> Cut <input type="checkbox"/> Chemical resistant - See Remarks below <input type="checkbox"/> Safety shoes <input type="checkbox"/> Garments/Other – long sleeve shirts</p> <p>Remarks: Remove contaminated clothing immediately. Use Nitrile or PVC gloves when fluid contact is unavoidable.</p>
	<p>Paint spraying</p>	<p><input type="checkbox"/> Skin/Hand <input type="checkbox"/> Inhalation <input type="checkbox"/> Chemical – Solvents, pigments</p> <p>Remarks: Refer the MSDSs. Some paints have special hazards and require special PPE.</p>	<p><input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant <input type="checkbox"/> Respirator - Contact EH&S for assistance. <input type="checkbox"/> Garments/Other</p> <p>Remarks: The type of chemical resistant glove may vary depending on the coating. Verify that the glove manufacturer's specifications are suitable for the material and the task. Refer to the MSDS. If a respirator is needed, contact EH&S for assistance. Respirator use requires medical monitoring, training, and fit testing.</p>
	<p>Plating</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Chemical – Corrosives, oxidizers, toxics</p> <p>Remarks: Refer to the MSDSs</p>	<p><input type="checkbox"/> Safety glasses/side shields – Minimum for all personnel in work area <input type="checkbox"/> Chemical splash goggles – When pouring corrosives/irritants <input type="checkbox"/> Face shield - When pouring corrosives/irritants <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant – For acid/base: Rubber, PVC, Solvex, Silver Shield or as recommended on MSDS. Only heavy neoprene for concentrated nitric acid. Always replace contaminated gloves promptly. Verify that the glove manufacturer's specifications are suitable for the material and the task.</p> <p><input type="checkbox"/> Closed-toed safety shoes <input type="checkbox"/> Garments/Other</p>
	<p>Soldering</p>	<p><input type="checkbox"/> Eye/Face</p>	<p><input type="checkbox"/> Safety glasses/side shields</p>
	<p>Welding</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Inhalation <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Puncture/Penetration <input type="checkbox"/> Electric Shock <input type="checkbox"/> Heat/Burn <input type="checkbox"/> Light/Radiation <input type="checkbox"/> Chemical – Heavy metals, fluorides</p> <p>Remarks: Inhalation hazards may be present if adequate ventilation cannot be provided.</p>	<p><input type="checkbox"/> Welder's goggles or helmet. Be sure to use the appropriate optical density for the welding being done. Contact EH&S for assistance, if necessary. <input type="checkbox"/> Welder's leather gloves with gauntlets <input type="checkbox"/> Safety shoes <input type="checkbox"/> Respirator – if adequate ventilation cannot be provided, e.g. in a confined space. Contact EH&S for assistance. <input type="checkbox"/> Garments/Other – Welder's jacket</p>
	<p>Woodworking</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Inhalation <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Puncture/Penetration <input type="checkbox"/> Chemical- wood dust, adhesives, paints, thinners, stains</p> <p>Remarks: Inhalation hazards may exist if adequate ventilation cannot be provided.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Gloves <input type="checkbox"/> Cut <input type="checkbox"/> Chemical resistant – Use chemical resistant gloves if skin contact from adhesives, paints, thinners, and stains may occur. Always replace contaminated gloves promptly. Verify that the glove manufacturer's specifications are suitable for the material and the task. <input type="checkbox"/> Safety shoes <input type="checkbox"/> Respirator- Contact EH&S for assistance.</p>

Guideline to Selection of Personal Protective Equipment

	<p>Vehicle Service (includes) Tune-up Transmission Service Oil Change Differential Service Air Conditioning Service Change Belts</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Hearing <input type="checkbox"/> Heat/Burn <input type="checkbox"/> Overhead <input type="checkbox"/> Chemical (e.g. Engine solvents, Ethylene Glycol)</p> <p>Remarks: Prolonged contact with engine oils, lubricants and grease may cause irritation. Engine oil and exhaust system parts are hot at operating temperatures and may be a burn hazard if the engine is not allowed to cool. The use of air driven tools can cause flying particles and noise.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Ear Plugs/Muffs <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant <input type="checkbox"/> Safety shoes <input type="checkbox"/> Garments/Other: Apron</p> <p>Remarks: Use of compressed air or air driven tools require eye protection and hearing protection. Special conditions may require additional protection such as an apron, or working overhead, the use of a bump cap.</p>
	<p>Tire Service (includes) Change Balancing Rotation</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Chemical - lead weights in tire balancing</p> <p>Remarks: Lead residues, dirt and grime from handling tires may be toxic if ingested due to poor hygiene practices. Air driven tools can cause flying particles and noise.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Ear plugs/Muffs <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant <input type="checkbox"/> Safety shoes <input type="checkbox"/> Garments/Other: Apron</p> <p>Remarks: N-Dex or latex gloves protect hands from contact with tire and lead residues. Aprons would protect garments from tire and wheel grime, etc.</p>
	<p>Brake Service (includes) Removal of worn brakes Installation of new brakes Turning drums</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Inhalation <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Puncture/Penetration <input type="checkbox"/> Chemical</p> <p>Remarks: Turning drums requires use of lathe that involves cutting tool, potential generation of particulate. Brake fluids can be irritating and the use of air driven tools can generate flying particles and noise.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Ear plugs/Muffs <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant <input type="checkbox"/> Safety shoes</p> <p>Remarks: N-Dex or latex protect against brake fluid contact and wheel cleaning solutions. Safety glasses with side shields protect against particles during the use of air driven tools and ear plugs/muffs protect against associated noise.</p>
	<p>Battery Maintenance</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Electric Shock <input type="checkbox"/> Heat Burn <input type="checkbox"/> Chemical</p> <p>Remarks: Splash of battery acid, electrical hazard during work or charging of battery.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Face shield (added over safety glasses) <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant <input type="checkbox"/> Safety shoes <input type="checkbox"/> Apron</p>
	<p>Radiator Maintenance (includes) Drain fluids Add fluids</p>	<p><input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Heat/Burn <input type="checkbox"/> Chemical Engine coolant (ethylene glycol)</p> <p>Remarks: Prolonged contact can be irritating. Operating temperatures can cause a burn if the vehicle is not allowed to cool. Coolant creates a splash hazard.</p>	<p><input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Gloves <input type="checkbox"/> Chemical resistant <input type="checkbox"/> Safety shoes</p>

Guideline to Selection of Personal Protective Equipment

	<p>Environmental Test Chamber Activity (testing for extreme heat and cold temperatures, impact, etc...)</p>	<p><input type="checkbox"/> Head <input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Inhalation <input type="checkbox"/> Overhead <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Puncture/Penetration <input type="checkbox"/> Electric Shock <input type="checkbox"/> Heat/Burn <input type="checkbox"/> Light/Radiation <input type="checkbox"/> Chemical (specify)</p> <p>Remarks: Need engineering controls to monitor for oxygen deficiency due to displacement by gasification of nitrogen.</p>	<p><input type="checkbox"/> Hardhat, Type <input type="checkbox"/> 1 (vertical impact) <input type="checkbox"/> 2 (vertical & side impact) -- <input type="checkbox"/> G (impact/low volt) <input type="checkbox"/> E (impact/high volt) <input type="checkbox"/> C (impact) <input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Goggles: <input type="checkbox"/> Impact <input type="checkbox"/> Chemical splash <input type="checkbox"/> Laser eyewear (specify λ, OD) <input type="checkbox"/> Face shield <input type="checkbox"/> Gloves <input type="checkbox"/> Cut <input type="checkbox"/> Heat <input type="checkbox"/> Electrical <input type="checkbox"/> Chemical resistant (specify) <input type="checkbox"/> Safety shoes <input type="checkbox"/> Respirator – Contact EH&S for assistance. <input type="checkbox"/> Ear plugs/muffs <input type="checkbox"/> Garments/Other (specify)</p> <p>Remarks: Use insulated gloves and apron when exposed directly to liquid nitrogen</p>
	<p>Handling biological material, tissue culture, injection/withdrawal of fluids, infectious agents, human or non-human primate material, Select Agents</p> <p>Handling research animals</p> <p>Handling biohazardous waste</p>	<p><input type="checkbox"/> Head <input type="checkbox"/> Eye/Face <input type="checkbox"/> Skin/Hand <input type="checkbox"/> Foot <input type="checkbox"/> Inhalation <input type="checkbox"/> Overhead <input type="checkbox"/> Flying/Falling Objects <input type="checkbox"/> Puncture/Penetration <input type="checkbox"/> Electric Shock <input type="checkbox"/> Heat/Burn <input type="checkbox"/> Light/Radiation <input type="checkbox"/> Chemical (specify)</p> <p>Remarks: <input type="checkbox"/> Splash to eye or mucous membrane <input type="checkbox"/> Accidental needle stick or puncture <input type="checkbox"/> Exposure to non-intact skin <input type="checkbox"/> Inhalation of aerosols <input type="checkbox"/> Biological (specify)</p> <p>Remarks: <input type="checkbox"/> Animal bites or scratches <input type="checkbox"/> Animal allergies <input type="checkbox"/> Contact with chemically or biologically contaminated bedding, cages, waste product</p>	<p><input type="checkbox"/> Lab Coat <input type="checkbox"/> Gloves <input type="checkbox"/> Latex <input type="checkbox"/> Nitrile <input type="checkbox"/> Equivalent <input type="checkbox"/> Closed Toed Shoes <input type="checkbox"/> Safety glasses/side shields <input type="checkbox"/> Respirator – Contact EH&S for assistance. <input type="checkbox"/> Dedicated scrubs <input type="checkbox"/> Lab Coat <input type="checkbox"/> Booties</p>

Guideline to Selection of Personal Protective Equipment

Selecting Chemical Resistant Gloves

GLOVE TYPE	USE
Butyl Rubber	Good for many organics, ketones, esters; Poor for aliphatic, aromatic hydrocarbons, halogenated hydrocarbons, gasoline
Natural Rubber	Good for very dilute acids and bases; Poor for organics
Neoprene	Good for acids and bases, peroxides, fuels, hydrocarbons, alcohols, phenols Poor for halogenated and aromatic hydrocarbons
Polyvinyl chloride (PVC)	Good for acids and bases, some organics, amines, and peroxides; Poor for most organics
Polyvinyl alcohol (PVA)	Good for aromatic and chlorinated solvents; Poor for water-based solutions- <i>water destroys the gloves!</i>
Silver Shield™	Good for wide variety of toxic and hazardous chemicals; provides the highest level of chemical resistance. Flexible laminate glove; Poor fit - comes in small, medium, large
4H™	Good resistance to many chemicals; better dexterity than Silver Shield™
Nitrile	Good for wide variety of solvents, oils, greases, some acids and bases and biohazardous materials
Viton™	Exceptional resistance to chlorinated and aromatic solvents; Good resistance to cuts and abrasions

Internet Resources: The following glove manufacturers have established Internet sites for glove information. (Note: These sites only reflect their own products.)

Ansell Edmont (www.ansell-edmont.com) Ansell Edmont Resistance Guide	MAPA Professional www.mapaglove.com
Best Glove www.chemrest.com	Microflex brand Latex/Nitrile Glove Chart
Kimberly Clark Kimberly Clark Safeskin Gloves	North Safety www.northsafety.com

To simultaneously search for the appropriate type of glove manufactured by any of the above listed companies, search by chemical name at the following website: http://www.hazmat.msu.edu:591/glove_guide/