Personal Protective Equipment Guidelines

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Revision History

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Requirements

The Occupational Safety and Health Administration (OSHA) requires employers to assess their workplace for hazards that might require the use of personal protective equipment. If it is determined that PPE is required, the supervisor must select the proper equipment and enforce its use by employees.

Hazard Control

The Hierarchy of Controls starts with the most effective controls on top and moves down in order of effectiveness. The best way to control hazards is to eliminate them completely. When that is not possible, substitution with a less hazardous substance is the next best control. Engineering controls isolate people from hazards, and administrative controls use plans, policies, and signage to change the way people work.

Personal protective equipment (PPE) is the least effective method for controlling and preventing exposure to hazards. While PPE provide barriers to hazards, they rely on proper selection, wearing, and maintenance by individuals. PPE may be required in addition to other controls by regulations or internal policies. The purpose of this guide is to provide information and tools to assess, manage, and understand the limitations of PPE.

Supervisor Responsibilities

Supervisors have the responsibility to review the required tasks of their employees and determine what PPE is needed. PPE needs are determined by regulations, the type of hazard, and other controls in place such as engineering and administrative controls. Departments that plan to use PPE should complete the following items.

- Assess work for possible hazards
- Select PPE appropriate for those hazards
- Enforce the use of PPE
- Ensure inspection, maintenance, and replacement procedures are in place to prevent the use of damaged PPE
- Train employees in the use, limitations, care, and maintenance of their PPE
- Keep records of assessment, selection, and training

Completing these tasks through an existing procedure document such as a lab safety manual, standard operating procedure (SOP), or job hazard analysis (JHA) is acceptable.

All PPE must be provided to the employees at the expense of the employing departments. The exceptions to this rule are prescription safety glasses and safety shoes.

If it is determined you do not need PPE, document this and keep it in your records.

PPE Guideline Use

Departments and supervisors at Florida Tech should use this guide to assess hazards in their workplace, select the proper PPE, train employees on PPE, and keeping documents of assessment, PPE selection, and training.

Assessment

Survey the worksite to identify hazards employees will be exposed to. You may use the Hazard Assessment Form in Florida Tech's Personal Protective Equipment Plan.

Selection

For PPE that must be used, list PPE that will be used for each identified hazard on the form.

Training

Once assessment and selection are completed, employees using must be trained before using the required PPE. Retraining must be done whenever there are changes to PPE requirements and as required by regulations and Florida Tech policy. You may use the Hazard Assessment Form in Florida Tech's Personal Protective Equipment Plan. Proper PPE training must include the following:

- What PPE to use
- When to use PPE
- Limitations of PPE
- How to put on, take off and adjust PPE
- How to inspect and maintain PPE
- Manufacturer instructions and warnings regarding PPE
- Making sure PPE is properly fitted
- How to obtain PPE
- How to dispose of PPE

Documentation

Maintain records that document PPE hazard assessment, selection, and training. The documentation should include:

- The jobs and activities being assessed
- The hazards identified
- The PPE selected for each hazard (specify type, brand, and model)
- Employee or job titles identified to require and use PPE
- Name and title of person completing the hazard assessment
- Date the assessment was completed
- Name, title, and training date for all employees required to wear PPE

Departments may use the forms provided in the Personal Protective Equipment Plan or use their own department forms (such as SOPs correctly filled out per the Chemical Hygiene Plan) provided they included the above documentation.

Hazard Control and PPE

Below is a list of work tasks, potential hazards, and possible controls and PPE that may be needed to protect from these hazards.

Laboratory Employees

Laboratory Workers			
Job	**Potential Hazard(s)**	**Controls**	**PPE**
Working with low hazard chemicals where there is a low chance of splashing	Skin/eye irritation	Fume Hood, local exhaust, general ventilation, enclosure process	Safety glasses, light chemical resistant gloves, closed toed and heeled shoes, long pants, long skirt, or other full leg covering
Working with small amounts (volumes less than a liter) of corrosive or injurious chemicals where there is a reasonable chance of splashing	Skin/eye damage	Fume Hood, local exhaust, general ventilation, enclosure process, bench top shield	Chemical splash goggles, light chemical resistant gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering
Working with large amounts (volumes greater than a liter) of corrosive or injurious chemicals where there is a reasonable chance of splashing, or working with toxic corrosives	Large surface area skin/eye damage, poisoning, great potential for skin/eye damage	Fume Hood, local exhaust, general ventilation, enclosure process, bench top shield	Chemical splash goggles, heavy chemical resistant gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering, chemical resistant apron
Working with small amounts (volumes less than a liter) of organic solvents	Skin/eye damage, slight poisoning potential via absorption	Fume Hood, local exhaust, general ventilation, enclosure process	Safety glasses, goggles if there is a splash potential, light chemical resistant gloves, closed toed and heeled shoes, long pants, long skirt, or other full leg covering

Working with large amounts (volumes greater than a liter) of organic solvents, working with highly toxic solvents, or potential splash hazards exist	Major skin/eye damage, poisoning potential via absorption	Fume Hood, local exhaust, general ventilation, enclosure process, bench top shield	Chemical splash goggles and face shield, heavy chemical resistant gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering, chemical resistant apron
Working with a small amount of human blood or body fluids and/or other potentially infectious materials	Potential for infectious disease transfer and spread of disease	Biological Safety Cabinet (BSC)	Safety glasses, disposable nitrile gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering
Working with large amounts of human blood or body fluids and/or other potentially infectious materials and/or splash hazards	Increased potential for infectious disease transfer and spread of disease	Biological Safety Cabinet (BSC), bench top shield	Safety goggles and face shield, disposable nitrile gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering, coveralls and foot covers as necessary
Working with hazardous powders	Potential skin/eye damage, potential for poisoning via absorption	Fume Hood, local exhaust, general ventilation, enclosure process	Safety glasses, goggles for large quantities, light chemical resistant gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering
Working with acutely toxic hazardous powders	Great potential skin/eye damage and for poisoning via absorption	Fume Hood, local exhaust, general ventilation, enclosure process	Safety glasses, goggles for large quantities, appropriate chemical resistant gloves, lab coat, closed toed and heeled shoes, long pants, long skirt, or other full leg covering, coveralls and booties if necessary

Working with dispersible radioactive materials	Potential for tissue damage and spread of radioactive contamination	Source shielding, minimize exposure time, increase distance from source	Appropriate eye protection, disposable nitrile gloves, lab coat, closed shoes, full leg covering (pants or skirt)
Working with radioactive materials with chemical hazards	See above sections for appropriate chemical hazard, potential for tissue damage and spread of radioactive contamination	See above sections for appropriate chemical hazard controls, source shielding, minimize exposure time, increase distance from source	See above sections for appropriate chemical hazard PPE, appropriate eye protection, disposable nitrile gloves, lab coat, closed shoes, full leg covering (pants or skirt)
Working with radioactive materials with biological hazards	See above sections for appropriate biological hazard, potential for tissue damage and spread of radioactive contamination	See above sections for appropriate biological hazard controls, source shielding, minimize exposure time, increase distance from source	See above sections for appropriate biological hazard PPE, appropriate eye protection, disposable nitrile gloves, lab coat, closed shoes, full leg covering (pants or skirt)
Working with sealed radioactive materials	Potential for tissue damage with high energy sources, broken or leaking sources can spread radioactive contamination	Fume hood, bench top shield, minimize exposure time, increase distance from source	Safety glasses, light gloves, lab coat, closed shoes, full leg covering clothing (pants or skirt), shield for high energy sources
Working with cryogenic liquids	Major damage to skin/tissues/eyes	Good general ventilation	Chemical splash goggles, face shield, cryogenic gloves, lab coat, closed shoes, full leg covering clothing.
Working with cold equipment or materials (freezers, dry ice)	Frostbite, hypothermia	Insulated storage containers, tools for handling objects	Safety glasses, insulated gloves, lab coat, closed shoes, full leg covering clothing, jackets, or other warming clothing

Working with hot equipment or materials or open flames (autoclave, Bunsen burner, hot water, or oil baths)	Skin/eye damage	Exhaust for heat, good general ventilation	Safety glasses or goggles for large volumes/splash hazards, insulated gloves, lab coat, closed shoes, full leg covering clothing
Working with large volumes of liquids at extreme temperatures (hot, cold, or cryogenic)	Major damage to skin/tissues/eyes, frozen or burned tissues	Excellent general ventilation, well insulated storage containers	Safety glasses or goggles and face shield, heavy insulated gloves, lab coat, closed shoes, full leg covering clothing
Working with UV radiation	Conjunctivitis, corneal eye damage, sunburn, erythema	Guard source, bench top shield	UV face shield and goggles, lab coat, closed shoes, full leg covering clothing
Working with LASERs	Retinal eye damage, skin damage	Guard source, bench top shield	Appropriate shaded goggles (optical density based on beam parameters), lab coat, closed shoes, full leg covering clothing, no jewelry or reflective items allowed
Working with Infrared radiation or Infrared emitting equipment (glass blowing)	Cataracts, flash burns to cornea	Guard source, bench top shield	Appropriate shaded goggles, lab coat, closed shoes, full leg covering clothing
Arc/TIG welding	Conjunctivitis, corneal eye damage, sunburn, erythema	Local exhaust ventilation, excellent general ventilation, shielding	Appropriate shaded goggles, welder's helmet with appropriate eye shade (Appendix A), working gloves
Instrument or equipment repair/service	Eye damage (from foreign objects)	Equipment guards, local exhaust	Safety glasses, no loose clothing/jewelry
Metal working/woodworking shop	Eye damage (from foreign objects)	Equipment guards, local exhaust	Safety glasses, no loose clothing/jewelry

Washing glassware	Cuts to skin	Designated area, appropriate equipment, and supplies	Safety glasses, heavy rubber gloves, lab coat, closed shoes, full leg covering clothing
Working in Industrial lab with potential injury from falling equipment or tools	Head injury, foot injury	Equipment bracing, securements, tool lanyards	Hard hat, steel toe shoes

Facilities, Shop, or Maintenance Employees

Shop/Maintenance/Facilities Workers			
Job	**Potential Hazard(s)**	**Controls**	**PPE**
Mechanical work on automobiles/heavy equipment	Flying particles, solvents (petroleum), solvent waste	Equipment guards, shielding, local exhaust, good general ventilation, good housekeeping	Safety glasses, chemical resistant gloves, hearing protection, safety shoes, safety head gear, protective clothing/aprons
Locksmith work	Flying particles	Equipment guards, shielding, local exhaust, good general ventilation, good housekeeping	Safety glasses, face shield for high speed tools, gloves, protective clothing
Woodwork (shop)	Noise, flying particles, lifting/carrying, rough surfaces	Equipment guards, shielding, local exhaust, good general ventilation, good housekeeping, insulate, secure noisy equipment	Hearing protection, safety glasses, face shield for high speed tools, puncture/cut resistant gloves, safety shoes, guards in place, dust mask
Metalwork (shop)	Noise, flying particles, lifting/carrying, rough surfaces, metalwork chemicals	Equipment guards, shielding, local exhaust, good general ventilation, good housekeeping	Hearing protection, safety glasses, face shield for high speed tools, puncture/cut resistant gloves, safety shoes, guards in place

Painting (shop)	Vapors, mists, solvents, flammables	Local exhaust, good general ventilation, good housekeeping	Safety glasses, organic vapor respirator with particulate pre-filter, chemical resistant gloves
Power plant work	Hot surfaces, contact with surfaces (head), noise	Equipment guards, shielding, local exhaust, good general ventilation, insulate and secure noisy equipment	Heat resistant gloves, hard hats, hearing protection
Tunnel work	Hot surfaces, contact with surfaces (head), restricted access areas, heat stress	Good general ventilation, lighting	Hard hat, light clothing, temperature resistant gloves, safety glasses
Elevator maintenance	Uncovered circuits and switches, falling, moving machinery	Equipment guards, shielding, local exhaust, good ventilation	Electrical insulated gloves rated for energized voltage, fall protection, cut/puncture resistant gloves
Confined space work	Hazardous atmosphere, restricted exit, other hazards determined by nature of the space	Warning signs, restricted entry, permitting may be required	Contact EHS for more information regarding confined space work
Arc welding/cutting	Electric shock, metallic sparks, molten/hot metal, UV/IR/intense visible light, falling, dropping, rolling, and sharp objects	Local exhaust ventilation, excellent general ventilation, shielding	Insulating mats/blankets, insulated/heat and puncture/cut resistant gloves, safety shoes, hard hat, safety glasses, welding shield or helmet with appropriate eye shade (Appendix A)
Oxy welding/cutting	Metallic sparks, molten/hot metal, UV/IR/intense visible light, falling, dropping, rolling, and sharp objects	Local exhaust ventilation, excellent general ventilation, shielding	Heat and puncture/cut resistant gloves, safety shoes, hard hat, safety glasses, welding shield or helmet with appropriate eye shade (Appendix A)

Torch brazing	Metallic sparks, molten/hot metal, UV/IR/intense visible light, falling, dropping, rolling, and sharp objects	Local exhaust ventilation, excellent general ventilation, shielding	Heat and puncture/cut resistant gloves, safety shoes, hard hat, filter lens glasses/goggles or safety glasses with welding shield/helmet with appropriate eye shade (Appendix A)
Torch soldering	Molten/hot metal, UV/IR/intense visible light, falling, dropping, rolling, and sharp objects	Local exhaust ventilation, excellent general ventilation, shielding	Heat and puncture/cut resistant gloves, safety shoes, hard hat, filter lens glasses/goggles or safety glasses with welding shield/helmet with appropriate eye shade (Appendix A)
Metal grinding/chipping	Metallic sparks and chips, falling, dropping, rolling, and sharp objects	Local exhaust ventilation, excellent general ventilation, shielding	Heat and puncture/cut resistant gloves, safety shoes, safety glasses, full face shield
Carpentry/Masonry/Laborer work at construction site	Flying particles, falling, falling objects, cuts/punctures, lifting/carrying	Equipment guards, secure objects and tools, guard rails, warning lines	Safety glasses, safety shoes, hard hat, cut/puncture resistant gloves, fall protection when working on elevated platforms/surfaces, face shields for use with high powered tools
Painting (construction)	Flying particles, falling, falling objects, cuts/punctures, lifting/carrying, solvents	Equipment guards, secure objects and tools, guard rails, warning lines	Safety glasses, safety shoes, hard hat, cut/puncture resistant gloves, chemical resistant gloves, fall protection when working on elevated platforms/surfaces, face shields for use with high powered tools

Roofing work	Falling, hot surfaces, heat, and cold stress, sealing chemicals, solvents, lifting/carrying	Installed roof anchors, guard rails, warning lines, Florida Tech Fall Protection Plan	Safety glasses, safety shoes, fall protection, heat resistant gloves, chemical resistant gloves, clothing appropriate to current weather conditions
Sheet metal work	Flying particles, lifting/carrying, rough surfaces	Equipment guards	Safety glasses, cut/puncture resistant gloves, face shields for use with high powered tools
Low voltage electrified equipment works	Electric shock, falling	Equipment guards and insulation, guard rails, warning lines, Florida Tech Fall Protection Plan	Safety glasses, safety shoes, hard hat, electrically insulated gloves (rated for voltage of energized equipment), insulated mats/blankets, non-synthetic work clothing, fall protection when working on elevated platforms/surfaces
High voltage electrified equipment works	Electric shock, arc, explosion and burns, falling, confined spaces, vehicles in traffic areas	Equipment guards and insulation, guard rails, warning lines, Florida Tech Fall Protection Plan	Hard hat, safety glasses, face shield, safety shoes, hard hat, electrically insulated gloves (rated for voltage of energized equipment), insulated mats/blankets, non-synthetic work clothing, fall protection when working on elevated platforms/surfaces, reflective equipment when working in traffic
Air conditioner or refrigeration work	Chemicals for water treatment	Good general ventilation	Chemical resistant gloves, safety glasses, face shield and goggles when using large volumes of chemicals

Plumbing work	Hot surfaces, rough surfaces, sewage		Heat resistant gloves, safety glasses, cut/puncture resistant gloves, rubber gloves
Carpentry work (use of wood/metal saws, other power tools)	Eye hazard, cuts, noise	Equipment guards	Safety glasses with side shields or goggles, face shield, hearing protection, guards in place, gloves appropriate for work
Moving wood/metal pieces, lifting	Feet hazards, dropping objects, piercing objects, wood splinters, pinching hazards		Leather work shoes/boots with thick soles, gloves
General maintenance work	Rough surfaces		Cut/puncture resistant gloves, safety glasses, safety shoes
Custodial work	Cleaning solvents/chemicals, splash hazards	Good ventilation, good housekeeping in storage areas	Chemical resistant gloves, safety glasses, face shield and goggles when pouring large volumes of chemicals
Refuse work	Noise, sharp objects, garbage		Hearing protection, safety glasses, puncture/cut resistant gloves, safety shoes, rubber gloves
Groundskeeping work	Pesticides, noise, flying particles, heat stress, insect, and plant toxins	Good ventilation, good housekeeping in storage areas	Hearing protection, safety glasses, gloves, protection from pesticides according to label, application, and reentry requirements, skin protection from insects and plants, safety shoes, gloves, respiratory protection as needed

Pest management	Pesticides, animals, and plants	Good ventilation, good housekeeping in storage areas	Safety glasses, gloves, protection from pesticides according to label, application, and reentry requirements, skin protection from animals and plants, respiratory protection as needed
Tree trimming	Pesticides, noise, falling, flying particles, heat stress, insect, and plant toxins	Good ventilation, good housekeeping in storage areas	Fall protection, hearing protection, protection from pesticides according to label, application, and reentry requirements, skin protection from insects and plants, safety shoes, safety glasses, gloves
Moving work	Lifting, carrying	Hand carts, hand trucks	Safety shoes, gloves

PPE Selection

Select PPE based on the completed Job Hazard Analysis. The information below provides information on PPE to select from and is not intended to be a comprehensive list.

Eye and Face Protection

PPE	Specific Type	Characteristics	Applications
Safety Glasses (ANSI Z87.1 compliant)		Polycarbonate lens, side shields (See Appendix B concerning wearing "over-protection" safety glasses or prescription safety glasses)	For work with physical, chemical, biological, and radiological hazards
Goggles (ANSI Z87.1 compliant)	Direct vented	Protects from impact and allows air flow through goggles	For work with particulates, should not be used with liquids or fine powder/dust hazards

Goggles (ANSI Z87.1 compliant)	Indirect vented	Protects from splashing by hooded or covered vent	For work with particulates and splashing chemicals
Goggles (ANSI Z87.1 compliant)	Non-vented	Protects from liquids, dust, mist, and vapors	For work with particulates and splashing chemicals, mists, liquids, and vapors
Disposable medical eye shield		Protects from splashing, spray, spatter, or droplets of blood or other potentially infectious biological hazards	For work in health care and with biological hazards, will not protect from chemical, physical, or impact hazards
Laser eyewear		Protects from laser radiation, must wear eyewear filtered to optical density/shading based on specific laser beam parameters	For work with Class 3B and Class 4 lasers: consult the Laser Safety Plan for more information
Surgical mask		Protects nose and mouth from direct contact with biological and chemical fluids, prevents spread of aerosolized infectious agents	For work in anatomical, surgical, medical, and chemical settings, surgical masks are NOT respirators
Face shield (ANSI Z87.1 compliant)		Protects from impact and chemicals, must be used in combination with safety glasses or goggles	For work where there is potential for chemical splashing, projectiles, apparatus under pressure or vacuum, or cryogenic handling
Disposable medical face shield		Protects from splashing, spray, spatter, or droplets of blood or other potentially infectious biological hazards	For work in health care and with biological hazards, will not protect from chemical, physical, or impact hazards
Optical face shield		Protects against radiation, protection determined by optical density value	For work with UV or infrared radiation

Welder's goggles (ANSI Z87.1)		Protects against impact and shaded for light filtration	For welding work with potential for sparks, scaling, and harmful radiation
Welder's helmet (ANSI Z87.1)		Protects against harmful radiation, see Appendix A for proper shading requirements	For welding work with potential for sparks, scaling, and harmful radiation
Arc-rated face shield (Under NFPA 70E)		Protects face against electrical hazards	For work with high or unknown electrical hazards

Hand Protection

In some cases, where several hazards are present, more than one glove type may need to be worn. An example includes using radioactive materials and live animals in research. A solution would be to wear disposable gloves to protect from the radiological hazard over the metal mesh glove for protection from the animal handling hazards. Consult EHS for questions regarding hand "overprotection."

PPE	Specific Type	Characteristics	Applications
Disposable gloves, thing gauge (powdered gloves are not allowed in medical use and should be avoided in other uses)	Disposable nitrile gloves	Protects from some chemicals (consult SDS and glove resistance charts before using)	For work with chemical and biological hazards in small quantities
Disposable gloves, thing gauge (powdered gloves are not allowed in medical use and should be avoided in other uses)	Disposable vinyl gloves	Protects from biologicals, economical	For work with biological hazards, NOT with chemical hazards

Disposable gloves, thing gauge (powdered gloves are not allowed in medical use and should be avoided in other uses)	Disposable latex gloves	Protects from some chemicals (consult SDS and glove resistance charts before using), may cause allergic reactions in some individuals	For work with biological hazards
Leather gloves (ANSI/ISEA)		Protect from moderate temperatures, sharp objects, and friction damage	For work with sharp objects, metal, field work, and welding
Wire mesh gloves		Protects from cuts	For work with sharp instruments or live animals
Chemical resistant multiple use gloves (powdered gloves are not allowed in medical use and should be avoided in other uses)(ANSI/ISEA)	Natural rubber latex	Protects from biologicals and water-based chemicals, poor protection from organic solvents	For work with small volumes of aqueous based low hazard chemicals
Chemical resistant multiple use gloves (powdered gloves are not allowed in medical use and should be avoided in other uses)(ANSI/ISEA)	Nitrile gloves	Protects from variety of chemicals (consult SDS and glove resistance charts before using)	For work with larger volumes of chemicals

Chemical resistant multiple use gloves (powdered gloves are not allowed in medical use and should be avoided in other uses)(ANSI/ISEA)	Butyl gloves	Protects from variety of chemicals (consult SDS and glove resistance charts before using)	For work with larger volumes of chemicals and hazardous material spills
Chemical resistant multiple use gloves (powdered gloves are not allowed in medical use and should be avoided in other uses)(ANSI/ISEA)	Viton© gloves	Protects from variety of chemicals (consult SDS and glove resistance charts before using)	For work with larger volumes of chemicals and hazardous material spills
Chemical resistant multiple use gloves (powdered gloves are not allowed in medical use and should be avoided in other uses)(ANSI/ISEA)	Silver shield gloves	Protects from variety of chemicals (consult SDS and glove resistance charts before using), over glove for manual dexterity if needed	For work with larger volumes of chemicals (especially methylene chloride) and hazardous material spills
Insulated gloves (ANSI)	Terrycloth autoclave gloves	Protects from heat	For work with hot equipment

Insulated gloves (ANSI)	Flame resistant (FR) gloves and glove liners	Protects from heat, may be referred to as flight gloves, typical materials include Nomex © and either leather or lycra blend, Rhovy/ESD carbon filament, and acrylic/FR rayon knit	For work handling some pyrophorics, liners can be worn other chemical-resistant gloves. Consult with EHS to determine best glove for your applications
Insulated gloves (ANSI)	Cryogen gloves	Protects from cryogens	For work with cryogens
Electrical safety gloves (ANSI/ Under NFPA 70E)		Protects from cuts, abrasions, punctures, and voltages based on the classes as follows: Class 00 – up to 500 volts, Class 0 – up to 1000 volts, Class 1 – up to 7500 volts, Class 2 – up to 17,000 volts, Class 3 – up to 26,500 volts, Class 4 – up to 36,000 volts	For electrical work with high or unknown electrical hazards

Skin and Body Protection

PPE	Specific Type	Characteristics	Applications
Disposable sleeves		Protects from particulates, some provide chemical resistance, protects clothing and skin	For work with particulates or chemical compounds
Disposable gowns		Protection type based on material, protects clothing and skin	For work with biological hazards and animals
Scrubs		Protects from biological and some chemical fluids, protects clothing and skin	For work in clinical, medical, and surgical settings
Tyvek gown/coveralls		Protects from particulates, some provide chemical resistance, protects clothing and skin	For work with biological hazards, chemical hazards, animals, or airborne particulates

Safety (visibility) vest		Reflective to provide increased visibility	For work on construction sites, in traffic hazard areas, and in emergency response
Cooling vest		Can provide cooling, may be heavy to wear	For work in hot environments
Lab coats (knee length) (ANSI)	Cotton	Protects from dirt, inks, non-hazardous chemicals, biological hazards without aerosols, protects clothing and skin	For general use with physical, chemical, biological, animal, and radiological hazards
Lab coats (knee length) (ANSI)	Barrier	Protects from blood and other potentially infectious materials	For work with human blood, bodily fluids, tissues, cells, or other potentially infectious materials/bloodborne pathogens
Lab coats (knee length) (ANSI)	Flame resistant (FR)	Flame resistant (e.g. Nomex or flame-resistant cotton)	For work with water/air reactive chemicals, flammable solvents, or potentially explosive chemicals (PECs)
Flame resistant coveralls (ANSI)		Flame resistant (e.g. Nomex or flame-resistant cotton)	For work with water/air reactive chemicals, flammable solvents, potentially explosive chemicals (PECs), welding, or electrical systems
Reflective clothing		Provides flame and heat resistance via aluminized flame-resistant material	For working in hot environments, welding
Leather apron, jacket, coveralls, and sleeves		Provides some protection from hot sparks and small projectiles	For work in welding, or shop work where there is potential for sparks and projectiles
Aprons (ANSI)	Flame resistant (FR) apron	Provides flame resistance	For work with flammable solvents, welding, or electrical systems
Aprons (ANSI)	Rubber coated wash apron	Protects from chemical splash and provides abrasion resistance	For work with apparatus under pressure or where there is potential of splashing hazardous liquids

Aprons (ANSI)	Neoprene apron and sleeves	Protects from chemical splash and provides chemical and tear resistance	For work with apparatus under pressure or where there is potential of splashing hazardous liquids

Respiratory Protection

PPE	Specific Type	Characteristics	Applications
Dust mask		May protect from dust, fumes, mists, microorganisms, and animal dander	For work in dusty environments, with live animals, or with potentially infectious materials
N95 respirator (NIOSH)		Protects from dust, fumes, mists, microorganisms, and animal dander	For work in dusty environments, with live animals, or with potentially infectious materials
Cartridge respirator (NIOSH)	Half face air-purifying	Protects from particulates, vapors, dust, mist, and/or fumes. Protection provided depends on filter/cartridge used	For work in dusty environments, chemical vapors, particulates, with live animals, with potentially infectious materials, and select gases (depending on filter/cartridge)
Cartridge respirator (NIOSH)	Full face air-purifying	Protects from particulates, vapors, dust, mist, and/or fumes with greater protection than half-face. Protection provided depends on filter/cartridge used	For work in dusty environments, chemical vapors, particulates, with live animals, with potentially infectious materials, and select gases (depending on filter/cartridge)
Powered air-purifying respirator (NIOSH)		Provides a supply of filtered air, can be used with HEPA filters and chemical cartridges	For work in some BSL-3 environments, high levels of chemical vapors, and particulates. May be worn with facial hair

Powered air-purifying respirator (PAPR) (NIOSH)	With welding protection	Provides a supply of filtered air, can be used with HEPA filters, shade selection for welder eye protection	For welding in low ventilation areas
Self-contained breathing apparatus (SCBA) (NIOSH)		Highly protective but bulky and with limited time use	For work in oxygen deficient atmospheres, immediately dangerous to life or health (IDLH) areas, or areas with high concentration of unknown contaminants

Benchtop Shielding

PPE	Specific Type	Characteristics	Applications
Radiation shield (ANSI)		Protects from radiation exposure, protection determined by shielding thickness and material, protects from some splashing hazards	For work with high energy beta and gamma emitting radioactive isotopes
Safety shield (ANSI)		Protects from chemical splashing, can be 1 or 3-sided	For work with potential chemical splashing hazards
Blast shield (ANSI)		Protects from explosives and over-pressure blasts	For use with explosives and PECs

Head Protection

PPE	Specific Type	Characteristics	Applications
Bouffant cap		Protects in hygienic work conditions and from dirt, dust	For work with biological hazards, surgical applications, and animal facilities
Flame resistant balaclava (ANSI)		Provides some protection from electrical equipment	For work in electrical applications with high or unknown hazards

Bump cap		Protects against head bumps and scraping	For work in low clearance areas, NOT for use to protect from falling or flying objects, and are NOT ANSI approved
Hard Hat (ANSI)	Class A: impact/penetration resistant and protects up to 2,220 Volts	Protects against overhead hazards such as falling objects, have expiration date and must be replaced before they expire	For work wear there is risk of falling objects or from falling (i.e. construction sites, elevated surfaces)
Hard Hat (ANSI)	Class B: impact/penetration resistant and protects up to 20,000 Volts	Protects against overhead hazards such as falling objects, have expiration date and must be replaced before they expire	For work wear there is risk of falling objects or from falling (i.e. construction sites, elevated surfaces)
Hard Hat (ANSI)	Class C: impact/penetration resistant, NOT for protection from electrical hazards	Protects against overhead hazards such as falling objects, have expiration date and must be replaced before they expire	For work wear there is risk of falling objects or from falling (i.e. construction sites, elevated surfaces)

Foot Protection

PPE	Specific Type	Characteristics	Applications
Shoe cover		Protects from dirt and dirt, for use in hygienic/clean room environments, with non-slip soles	For work with biological hazards, animals, or potential floor contaminants
Foot/shin guards and knee pads		Provides some protections to shins and to knees (when kneeling)	For work with high pressure washers, heavy materials, and work while kneeling
Slip resistant shoes (ANSI)		Protects from slipping	For work in animal facilities, custodial work, food service facilities, medical/clinical facilities, and work shops
Safety shoes (ANSI)		Provides extra toe, metatarsal, and foot protection with steel inserts/reinforcements	For work handling heavy objects, construction, warehouse, and agriculture

Hearing Protection

Ear Plugs (ANSI)		Protects hearing, disposable, inexpensive	For work with loud equipment, noises, sounds, alarms, etc.
Canal caps (ANSI)		Protects hearing (but less effectively than ear plugs), inexpensive, easier to insert	For work with loud equipment, noises, sounds, alarms, etc.
Earmuffs (ANSI)		Protects hearing, reusable, not as effective when worn with safety glasses	For work with loud equipment, noises, sounds, alarms, etc.

Fall Protection

PPE	Specific Type	Characteristics	Applications
Full body harness (ANSI)		Protects from injury when falling from heights	For work at heights greater than 6 feet and for confined space retrieval
Locking carabiner		Connections for fall protections systems	For work at heights greater than 6 feet and for confined space retrieval
Shock absorbing lanyard (ANSI)		Connection from harness to anchor point can lessen fall force factor, working length six feet	For work at heights greater than 18.5 feet and for fall arrest situations
Self-retracting lifeline with swivel (ANSI)		Connection from harness to anchor point can lessen fall force factor	For work at heights greater and for fall arrest situations where greater worker mobility is required
Anchor (ANSI)		Point of attachment for fall protection systems with minimum 5,000-pound breaking strength	For work at heights greater than 6 feet and for confined space retrieval

Arc Flash and Electrical Protective Clothing and PPE

Hazard Category	Minimum arc rating (Cal/cm^2)	Arc-rated clothing	Fire-rated protective equipment
0	N/A	Arc-rated not required Untreated natural fiber or non-melting clothing Long sleeve shirt and long pants	Safety glasses or safety goggles Hearing protection Heavy duty leather gloves as needed
1	4	Long sleeve shirt and long pants or coverall Face shield or arc flash suit hood Jacket, parka, rainwear, or hard hat liner as needed 1 layer	Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear as needed
2	8	Long sleeve shirt and long pants or coverall Face shield or flash suit hood and balaclava Jacket, parka, rainwear, or hard hat liner as needed 1 or 2 layers	Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear
3	25	Long sleeve shirt Long Pants Coverall Arc flash suit jacket, pants, and hood Gloves Jacket, parka, rainwear as needed Hard hat liner as required 2 or 3 layers	Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear

4	40	Long sleeve shirt Long Pants Coverall Arc flash suit jacket, pants, and hood Gloves Jacket, parka, rainwear as needed Hard hat liner as required 3 or more layers	Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear

Safe Use and Removal of PPE

PPE should fit comfortably (neither too tight or too loose), and it should not impede movement or communication. Select the right PPE for the task. Do not wear PPE that could potentially cause injury, such as loose-fitting gloves that could be caught in moving parts of equipment or machinery. If you must use loose-fitting gloves, tape the ends to the cuffs of your lab coat: this will help prevent snagging and chemicals from running down your arms.

Never wear PPE outside of laboratory or shop areas. This prevents spreading contamination to other areas.

Only employees trained properly in putting on and taking of PPE may use them. PPE must be handled safely when removing it to avoid contaminating themselves and nearby areas. Disposable PPE should be peeled off by turning them inside out as they are removed. Reusable gloves, aprons and other potentially contaminated items should be rinsed off before removing them and then peeled off or folded so that the contaminated surface is wrapped inside.

Inspection, Maintenance, and Storage of PPE

You must inspect your PPE every time you use them. Inspect for symmetry: symmetrical PPE should not have any distortions and should be mirror images down the plane of symmetry. Look for broken, bent, frayed, and torn pieces. Check the lenses on eye protection for scratches and check the straps on PPE for elasticity and overstretching.

Electrically insulated PPE must be tested prior to initial use, every six months for gloves, and every 12 months for sleeves and blankets.

Keep PPE clean: dirty PPE will break down more rapidly. Use soap and warm water. Do not use abrasive or solvent cleaners.

Store PPE away from sunlight. It should be stored in an area where it will remain clean and be protected from damage from physical and chemical hazards.

Follow the manufacturer's recommendation for replacing reusable PPE: this is generally every 2-5 years. Replace PPE earlier if there are major impacts and damage. Replace damaged or defective parts with parts made by the same manufacturer for use with the PPE. Do not use makeshift parts or repairs. If PPE cannot be repaired, replace it. Do not use paint, glue, or tape to mark PPE. Use decals or stickers.

Sources of PPE

Several online and local vendors are available for the selection of PPE. Contact EHS for more information.

Before using respirators, make sure you have completed medical evaluation, training, and fit testing. Contact EHS for more information.

Resources

- University of Washington EH&S Guidelines For Personal Protective Equipment (PPE), 11/2017 https://www.ehs.washington.edu/system/files/resources/ppeguidelines.pdf
- Florida Tech Environmental Health and Safety Chemical Hygiene Plan: https://www.fit.edu/office-of-environmental-health-and-safety/chemical-safety/
- Florida Tech Environmental Health and Safety Fall Protection Plan: https://www.fit.edu/office-of-environmental-health-and-safety/occupational-safety--health/
- Florida Tech Environmental Health and Safety Personal Protective Equipment Plan: https://www.fit.edu/office-of-environmental-health-and-safety/occupational-safety--health/
- Florida Tech Environmental Health and Safety Respiratory Protection Plan: https://www.fit.edu/office-of-environmental-health-and-safety/respiratory-protection-program/
- Occupational Health and Safety Administration Personal Protective Equipment, 2023: https://www.osha.gov/Publications/osha3151.pdf

Appendix A – Shading Guides for Welding Operations

Welding Operation	Shade Number
Shielded metal-arc welding – (1/16, 3/32, 1/8, 5/32-inch electrodes)	10
Gas-Shielded arc welding (nonferrous) – (1/16, 3/32, 1/8, 5/32 – inch electrodes)	11
Gas-shielded arc welding (ferrous) – (1/16-, 3/32-, 1/8-, 5/32-inch electrodes)	12
Shielded metal-arc welding: 3/16, 7/32, ¼ inch electrodes	12
Shielded metal-arc welding: 5/16, 3/8-inch electrodes	14
Atomic Hydrogen Welding	10 to 14
Carbon Arc Welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, 6 inches and over	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 inch to ½ inch	5 or 6
Gas welding (heavy) ½ inch and over	6 or 8

Note: start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxy-fuel gas welding or cutting where the torch produces a high yellow light, use a filter lens that absorbs the yellow or sodium line in the visible light of the spectrum.

Appendix B – Safety Shoes and Prescription Safety Glasses

Safety Shoes

Safety shoes may be required/recommended in various jobs at the University to help prevent injuries to feet. Departments are not required by regulations to provide safety shoes. Individual departments determine policy on providing, not providing, or sharing the cost of safety shoes. It is recommended that any acquired safety shoes meet ANSI Z41-1999 or ASTM F2413-2005 standards.

Prescription Safety Glasses

Employees who wear corrective lenses need to wear safety glasses or goggles that fit over the glasses or wear prescription safety glasses. Departments are not required by regulations to provide prescription safety glasses: the one exception is providing prescription insert lenses for workers who wear full face respirators. Individual departments determine policy on providing, not providing, or sharing the cost of prescription safety glasses. Any acquired prescription safety glasses must have impact resistant lenses/frames, permanently attached side shields, and meet ANSI standard Z87.1.