



GUIDELINES FOR PERSONAL PROTECTIVE EQUIPMENT (PPE)

3/2019

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This is a guide to fulfill the minimum requirements and doesn't cover every conceivable hazard. If you need additional assistance in identifying engineering or administrative controls or in selecting PPE for a hazard, contact the Environmental Safety at office of Facilities and Public Safety at 240-567-4293, e-mail: environmentalsafety@montgomerycollege.edu.

Acknowledgement

This manual was used with permission from University of Washington Environmental Health and Safety Office. We have modified the original manual to fit practices at Montgomery College.

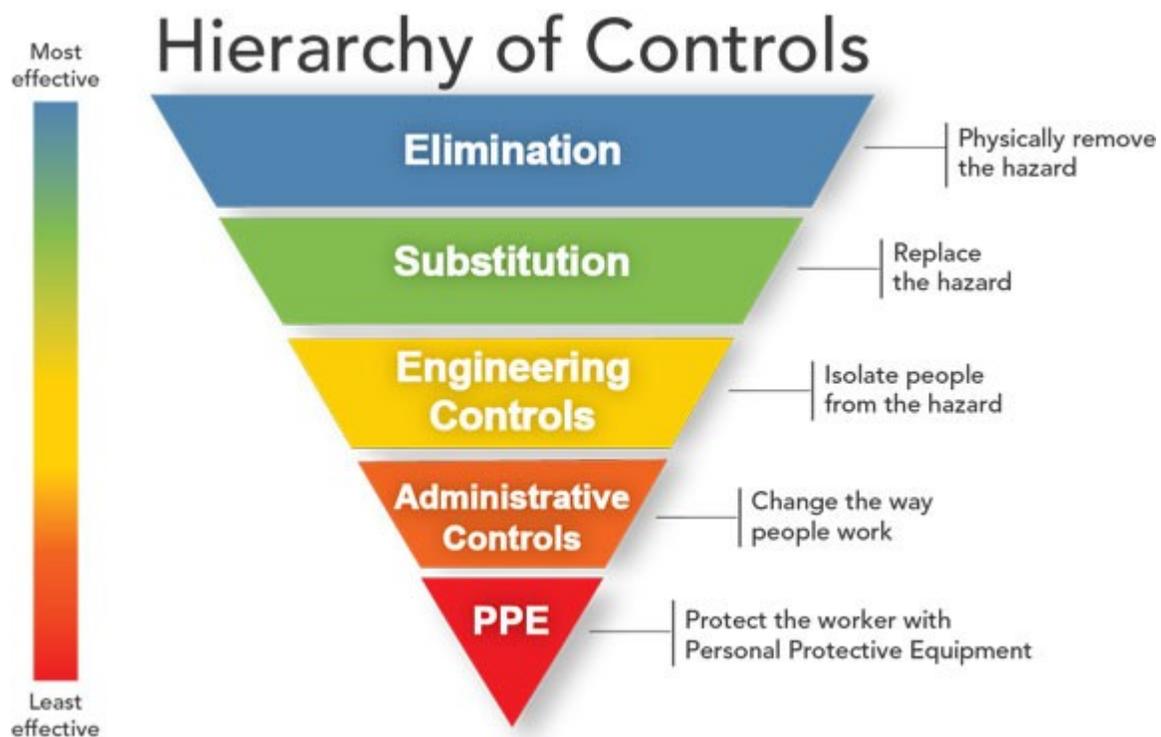
Original manual can be accessed from <http://www.ehs.washingtom.edu>.

REQUIREMENTS

The Occupational Safety and Health Administration OSHA 29 CFR 1910. 132 Personal Protective Equipment Standard requires all employers to assess their workplace for hazards that might require the use of personal protective equipment. If PPE has to be used, the supervisor must select the proper equipment and require its use.

HAZARD CONTROL

Eliminating hazards through engineering or administrative control measures is the best way to protect people. The strategy used for the selection of controls is called the “hierarchy of controls” which prioritizes the types of controls that are most effective in eliminating or reducing the risk of exposure to the hazard.



PPE is the least effective for controlling or preventing exposure to a hazard. PPE provides a barrier to protect the worker from potential exposure to hazards, however due to the reliance on the worker to select, wear and maintain PPE, the likelihood of exposure to the hazard with PPE alone increases.

In some cases, PPE is required by regulations or internal procedures and can provide an additional control to help protect the worker. This guide will provide information and tools to assess PPE, manage and understand the limitations of PPE.

SUPERVISOR RESPONSIBILITIES

Each Supervisor has the responsibility to review all of their employees' jobs for PPE needs. The regulations, the degree of hazard, and the engineering or administrative controls that are in place will determine what PPE is needed. If departments will be using PPE for personnel hazards, the following items must be completed:

- Assess the workplace for hazards
- Select appropriate PPE
- Ensure PPE is used
- Establish inspection, maintenance and replacement procedures to make sure damaged PPE is not used
- Train employees in proper use, limitations, care and maintenance of PPE
- Document assessment, selection, and training

If all of the above mentioned items are documented in existing departmental procedures, such as a laboratory safety manual, departmental Standard Operating Procedures (SOPs) or Job Hazard Analyses (JHAs), for all employee worksites, then no further work is needed.

When the hazard assessment indicates that PPE is required, employing departments must provide the PPE to employees free of charge. Exceptions are prescription safety glasses and safety shoes.

Where a hazard assessment determines that no PPE is needed, document the assessment and you're done. However, remember that if a hazard exists which does not require PPE, other regulations or programs may be applicable. Contact Environmental Safety if you have questions or concerns.

HOW TO USE THIS GUIDE

This guide is designed to help departments and supervisors in the steps to assess their workplace, select the right equipment, train employees and document this work. In addition, ES has developed the following "PPE Tools" for laboratories and shops to assist, laboratory managers and shop supervisors in assessing and documenting hazards and appropriate PPE for their specific work areas.

Step One: Assessment

Select the job, process or procedure you are going to assess. Survey the worksite and identify the hazards the worker will be exposed to while doing the work. Use one of the EH&S PPE Hazard Assessment Guides or a worksheet of your own to list the identified hazards. The HAZARD CONTROL AND PPE section below may help determine the hazards.

Step Two: PPE Selection

If PPE must be used, list the PPE that will be used for each hazard identified on your form. The supervisor or person completing the assessment and selection must sign and date the form.

Step Three: Training

After the assessment and selection, employees required to use PPE must be trained before they are required to use the PPE. Retraining must be done if PPE requirements change and as needed. All of the following must be covered:

- What PPE to use and when to use it
- Limitations of the PPE
- How to put it on, take it off and adjust it
- Inspection and maintenance
- Any manufacturer instructions and warnings
- Make sure the PPE fits well
- How to obtain PPE
- How to dispose of PPE

Step Four: Documentation

The following information must be retained by College departments to document the PPE hazard assessment, PPE selection and training.

- Job, process, or activity being assessed
- Hazards identified
- Selection of PPE used for each hazard identified. PPE type, brand, model may need to be specified.
- Person(s) or job title identified to use PPE
- Name and title of person completing the hazard assessment
- Date hazard assessment was completed
- Name, title, training date for all employees required to wear PPE.

Forms are included in the laboratory and shop PPE hazard assessment guides. You may devise your own method for documenting these actions.

Remember: Departments that record this information in existing policies or procedures may continue to use their current method and do not need to create new documentation for PPE.

For example, laboratories write an SOP as part of their Chemical Hygiene Plan. A properly written SOP contains all of the needed information along with documentation of the employee training.

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HAZARD CONTROL AND PPE

This section provides an overview of exposure controls and PPE that may be needed for a variety of tasks that have potential hazards. For specific task procedures and recommended controls in laboratories, consult the Laboratory Safety Manual; for Shops and Maintenance workers, ask your supervisor.

| Laboratory worker | | | |
|--|--|---|--|
| Task(S) | Potential Hazard | Controls | PPE |
| Working with low hazard chemicals when a low probability of splash exists | Skin and eye irritation | Fume hood, local exhaust, good general ventilation, enclose process | Safety glasses Light chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg |
| Working with smaller amounts (<1 liter) of corrosive or injurious chemicals where a reasonable probability of splash exists | Skin and eye damage | “ Bench top shield | Chemical splash goggles Light chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) |
| Working with larger quantities of corrosive liquids (> 1 liter), or toxic corrosives | Large surface area skin and eye damage Poisoning, or great potential for eye and skin damage | “ | Chemical splash goggles & face shield, Appropriate heavy chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) and chemical resistant apron |
| Working with small volumes of organic solvents (< 1 liter) | Skin and eye damage Slight poisoning potential through skin absorption | “ | Safety glasses, goggles if splash hazard exists Light chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) |
| Working with large volumes of organic solvents (> 1 liter), highly toxic organic solvents or work which may create a splash hazard | Major skin and eye damage Potential poisoning through skin absorption | “ Bench top shield | Safety goggles & face shield Appropriate heavy chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) and chemical resistant apron |
| Working with hazardous powders | Potential skin and eye damage Potential for poisoning through skin absorption | Fume hood, good general ventilation, enclose process | Safety glasses, goggles for large quantities, Light chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) |

| | | | |
|--|--|--|--|
| Working with acutely toxic hazardous powders | Great potential skin and eye damage Great potential for poisoning through skin absorption | “ | Safety goggles Appropriate chemical resistant gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts), coveralls and booties if necessary |
| Working with sealed radioactive sources | Damaged or leaking source may spread contamination Some leaking sources may pose an external dose risk. | Fume hood Bench top shield Minimize exposure time Increase distance to source | Safety glasses Light gloves Shield may be needed for high energy source |
| Working with very cold materials and equipment (freezers, dry ice) | Frostbite Hypothermia | Use tools to handle objects Well insulated storage containers | Safety glasses Insulated gloves and warm clothing Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) |
| Working with hot liquids, equipment and/or open flames | Skin damage Eye damage | Exhaust heat, good general ventilation | Safety glasses or goggles for large volumes or splash hazards |
| (autoclave, Bunsen burner, water bath, oil bath) | | Equipment guards | Insulated gloves, Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) |
| Arc/TIG welding | Conjunctivitis Corneal eye damage Erythema | Local exhaust ventilation, excellent general ventilation Shielding | Appropriate shaded goggles, welder’s helmet with appropriate eye shade (see Appendix A) Working gloves |
| Instrument or equipment repair/service | Eye damage from foreign objects | Equipment guards Local exhaust | Safety glasses, No loose clothing or jewelry |
| Metal working/Woodworking shop | Eye damage from foreign objects | “ | Safety glasses, No loose clothing or jewelry |
| Glassware washing | Skin lacerations | Designated area Appropriate equipment and supplies | Safety glasses Heavy rubber gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts) |

| | | | |
|--|--|---|---|
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| Shop and Maintenance workers | | | |
|---|--|---|--|
| Task(s) | Potential Hazard | Controls | PPE |
| Automobile/Heavy Equipment Mechanic Work | Flying particles, petroleum solvents and wastes | Equipment guards, shielding Local exhaust, good general ventilation Good housekeeping | Safety glasses, chemical resistant gloves |
| Locksmith Work | Flying particles | " | Safety glasses, face shield when using high speed tools |
| Wood Working Work (Shop) | Noise, flying particles, lifting/carrying, rough surfaced materials | " Insulate, secure noisy equipment | Hearing protection, safety glasses, face shield for high speed tools, puncture/cut resistant gloves, safety shoes, guards in place |
| Metal Working Work (Shop) | Noise, flying particles, lifting/carrying, rough surfaced materials, metal working chemicals | " | Hearing protection, safety glasses, face shield for high speed tools, puncture/cut resistant gloves, safety shoes, guards in place |
| Painting (Shop) | Vapors, mists, solvents and chemicals, flammables | Local exhaust, good general ventilation Good housekeeping | Safety glasses, organic vapor respirator w/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, secure noisy equipment | Heat resistant gloves, hard hats, hearing protection |

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| Tunnel Work | Contact (head), restricted access areas, heat stress, hot | Good general ventilation, lighting | Hard hat, light clothing, temperature resistant gloves, safety glasses |
| Elevator Maintenance Work | Uncovered electrical switches and circuits, falling, moving machinery | Equipment guards, shielding Local exhaust, good general | Electrically insulated gloves (rated for energized voltage), fall protection, cut/puncture resistant gloves |
| Confined Space Work | Hazardous atmosphere, restricted exit, other depending on nature of the space | Warning signs, restricted entry, permit may be required per UW Confined Space Entry Program | Determine appropriate personal protective equipment in accordance with the UW Confined Space Entry Program |
| Arc Welding or Cutting | Electric shock, metal sparks, molten and hot metal, UV, IR and visible light, falling, dropping, rolling and sharp objects | Local exhaust ventilation, excellent general ventilation Shielding | Insulating mats or blankets, insulated/heat and puncture/cut resistant gloves, safety shoes, hard hat, safety glasses, welding shield or helmet with appropriate eye shade (see |
| Oxy-fuel Welding or Cutting | Metal sparks, molten and hot metal, UV, IR and visible light, falling, dropping, rolling and sharp | “ | Heat and puncture/cut resistant gloves, safety shoes, hard hat, safety glasses, welding shield or helmet with appropriate eye shade (see Appendix A) |
| Torch Brazing | Metal sparks, molten and hot metal, UV, IR and visible light, falling, dropping, rolling and sharp objects | “ | Heat and puncture/cut resistant gloves, safety shoes, hard hat, filter lens spectacles or goggles, or safety glasses and hand shield, with appropriate eye shade (see Appendix A). |
| Torch Soldering | Molten and hot metal, UV, IR and visible light, falling, dropping, rolling and sharp objects | “ | Heat and puncture/cut resistant gloves, flame resistant clothing, safety shoes, hard hat, filter lens spectacles or goggles, or safety glasses and hand shield, with appropriate eye shade (see Appendix A). |
| Metal Grinding or Chipping | Metal sparks and chips, falling, dropping, rolling and sharp objects | “ | Heat and puncture/cut resistant gloves, typical work clothing, safety shoes, safety glasses, full face shield |
| Carpentry Work (Construction Site) Masonry Work (Construction Site) Laborer Work (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 at elevations. When using high speed power tools, a face shield. |

| | | | |
|---|--|--|---|
| Painting Work (Construction Site) | Flying particles, falling, falling objects, cuts/puncture, lifting/carrying, cleaning solvents | “ | Safety glasses, safety shoes, hard hat, cut/puncture resistant gloves, chemical resistant gloves, fall protection when working at elevations. When using high speed power tools, a face shield. |
| Roofing Work | Falling, hot surfaces, heat and cold stress, sealing chemicals, solvents, lifting/carrying | Installed roof anchors, guard rails, warning lines, fall protection plans | Safety glasses, safety shoes, fall protection, heat resistant gloves, chemical resistant gloves. Temperature stress protective clothing, depending on weather conditions. |
| Sheet Metal Work (Construction Site) | Flying particles, lifting/carrying, rough surfaced materials | Equipment guards | Safety glasses, safety shoes, puncture/cut resistant gloves. When using high speed power tools, a face shield. |
| Low Voltage Electrified Equipment Work | Electric shock, falling | Equipment guards and insulation, guard rails, warning lines, fall protection plans | Electrically insulated gloves (rated for voltage of energized equipment), insulated blankets or mats, non-synthetic work clothing, fall protection when working at elevations |
| High Voltage Electrified Equipment Work | Electric shock, arc, explosion and burns, falling, confined spaces, vehicles in traffic areas | “ | Hard hat, safety glasses, face shield, insulated gloves (rated for voltage of energized equipment), insulated blankets or mats, non-synthetic work clothes, safety shoes, fall protection when working at elevations, reflective clothing when working near traffic |
| Air Conditioning/Refrigeration Work | Water treatment chemicals | Good general ventilation | Chemical resistant gloves, safety glasses. When using large quantities of chemicals, a face shield & goggles |
| Plumbing Work | Hot surfaces, rough surfaced materials, sewage | | Heat resistant gloves, safety glasses, cut/puncture resistant gloves, rubber gloves |
| Carpentry Work Operating wood and metal saws and other power tools | Eye hazard, cuts from blade, noise | Equipment guards | Safety glasses with side shields or goggles, face shield, hearing protection, guard in place Gloves appropriate for work |
| Moving wood and metal pieces, lifting | Foot hazard, dropping objects and piercing objects, wood splinter, pinch | | Leather work shoe/boot with thick sole, gloves |

| | | | |
|--------------------------|--|---|---|
| General Maintenance Work | Rough surfaced materials, lifting/carrying | | Cut/puncture resistant gloves, safety glasses, safety shoes |
| Custodial Work | Cleaning chemicals, splashes | Good ventilation and housekeeping in chemical storage areas | Chemical resistant gloves, safety glasses. When pouring large quantities of chemicals, a face shield & goggles. |
| Refuse Work | Noise, sharp objects, garbage | | Hearing protection, safety glasses, cut/puncture resistant gloves, rubber gloves, safety shoes |
| Grounds Keeping Work | Pesticides, noise, flying particles, heat stress, insect and plant toxins | Good ventilation and housekeeping in chemical 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 Work | Pesticides, animals and plants | Good ventilation and housekeeping in chemical 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 work | Pesticides, falling, noise, flying particles, heat stress, insect and plant toxins | Good ventilation and housekeeping in chemical 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 | Provide carts, hand trucks | Safety shoes, gloves |

PPE SELECTION

PPE selection should be based on a job hazard analysis (JHA), which includes evaluation of hazards, specific tasks, procedures and work practices, in consultation with area supervision and ES as needed. See the [Environmental safety webpage](#) for more information and link to a template JHA. This PPE selection guidance is not intended to be a comprehensive resource on PPE.

[Eye and Face Protection](#)
[Hand Protection](#)
[Skin and Body Protection](#)
[Respiratory Protection](#)
[Bench Top Shields](#)

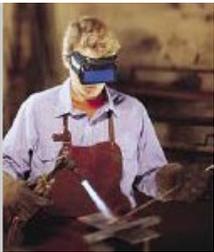
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Eye and Face Protection

Safety glasses, safety goggles, laser eyewear, face shields and helmets provide a level of protection as designated by the manufacturer. The hazard and the protection standards for each piece of eye and face protection PPE must be considered during selection.

| PPE | Specific Type | Characteristics | Applications |
|---|--|---|---|
| Safety glasses Comply with ANSI Z87.1 |  | Polycarbonate lens, side shields [Note: Personnel with corrective lenses will need "over-prescription" safety glasses or prescription safety glasses. Contact ES for information on how to obtain prescription safety glasses] | Working with chemical, biological, radiation, physical hazards |
| Goggles Comply with ANSI Z87.1 | Indirect vented  | Provides protection from splash entry by a hooded or covered vent | Protection from particulates and from chemical splash |
| | Non-vented  | Provides protection against the passage of dust, mist, liquid and vapors | Protection from particulates, chemical splash, and mist, liquid and vapors |
| Disposable medical eye shield |  | Provides protection from splash, spray, spatter or droplets of blood or other potentially infectious materials. [Not ANSI Z87.1 compliant] | Health care, biological hazards [Note: Not for protection from chemical, physical, and impact hazards] |
| Surgical/ procedure mask |  | Protects nose and mouth from direct contact with biological and chemical fluids; prevents spread of aerosolized infectious biological agents | Anatomical, surgical, medical and clinical settings [Note: Mask is not a respirator that protects from breathing anything into the lungs.] |

| PPE | Specific Type | Characteristics | Applications |
|--|---|--|--|
| Face shield Comply with ANSI Z87.1 |  | Impact and chemical resistant face shield must be combined with safety glasses or goggles | For use with potential chemical splash or projectiles, apparatus under pressure or vacuum, cryogenics handling |
| Disposable medical face shield |  | Provides protection from splash, spray, spatter or droplets of blood or other potentially infectious materials [Not ANSI Z87.1 compliant] | Health care, biological hazards [Note: Not for protection from chemical, physical, and impact hazards] |
| Welder's goggles |  | Impact resistant lenses and available in graduated shades of light filtration | Welding with potential sparking, scaling, harmful light rays |
| Welder's helmet |  | Durable helmet with filtered lens Ensure proper shade number is chosen for darkness of the lens. See Appendix A. | Welding to protect eyes and face against heat, sparks, flash burn, ultraviolet or infrared light |
| Arc-rated face shield |  | Specialized electrical safety equipment for facial protection | Electrical safety applications with higher hazard/risk or unknown |

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Hand Protection

Gloves should be selected for each procedure to provide protection from the hazards. In some circumstances there may be several hazards and glove selection may involve different gloves for different steps of the procedure and/or several layers of gloves may be needed to address all hazards.

In general, heavy loose gloves should not be worn around moving machinery. Moving parts can pull the glove, hand and arm into the machine.

| PPE | Specific Type | Characteristics | Applications |
|--|--|--|---|
| Disposable gloves, thin-gauge* (<8 - 10 mils) [Note: Avoid powdered gloves - banned in medical use, possible inflammation and allergic reactions] | Disposable nitrile gloves  | Some chemical resistance – consult glove resistance chart, incidental chemical contact only | Working with biological hazards and chemical hazards of small quantity |
| | Disposable vinyl gloves  | Economical and thin | Working with biological hazards, not for chemical handling |
| | Disposable latex gloves  | Some chemical resistance – consult glove resistance chart, incidental chemical contact only [Note: some workers may be allergic to latex] | Working with biological hazards (known or potentially infectious materials including work with animals) |
| Leather gloves |  | Protect and comfort hands from moderate temperatures, sharp objects, damage by friction | Handling sharp objects and metal, field work, welding |
| Kevlar or Heavy Cotton gloves |  | Cut resistant | Metal work and other sharp objects |

| PPE | Specific | Characteristics | Applications |
|---|--|--|---|
| Chemical resistant gloves, multi-use* [Note: Avoid powdered gloves - banned in medical use, possible inflammation and allergic reactions] | Natural rubber latex  | Good resistance to biological or water-based materials, poor organic solvent resistance – consult glove resistance chart | Working with small volumes of aqueous-based low hazard chemicals |
| | Nitrile gloves  | Chemical resistant to many chemicals – consult glove resistance chart | Working with larger volumes of chemicals |
| | Butyl gloves  | Generally good chemical resistance to many chemicals – consult glove resistance chart | Working with larger volumes of chemicals, hazardous material spills |
| Insulated gloves | Terrycloth autoclave gloves  | Heat resistant | Working with hot equipment or cold |
| Electrical safety gloves |  | Insulated voltage-rated rubber, gauntlet length, leather gloves worn over to protect against cuts, abrasions and punctures The different voltage classes of gloves are 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 | Electrical safety applications with higher hazard/risk or unknown |
| *Always check the manufacturer’s chemical resistance guides before selecting chemical-resistant gloves. | | | |

Skin and Body Protection

Laboratory coats, scrubs, uniforms and disposable body coverings provide a level of protection from splash hazards. Special hazards and material qualities such as flame resistance, specific chemical resistance, physical strength (e.g., leather) and visibility should be considered when selecting PPE for skin and body protection.

| PPE | Specific Type | Characteristics | Applications |
|----------------------------------|--|---|---|
| Tyvek gown/coveralls |  | Clothing and skin protection, tear resistant, protection from particulates Some Tyvek clothing is coated for chemical resistance | Working with biohazards, chemicals, animals or airborne particulates |
| Safety (visibility) vest |  | Colorful and/or reflective | Construction sites, traffic hazard areas, emergency response |
| Lab coats (knee length) | <p style="text-align: center;">Cotton</p>  | Protects skin and clothing from dirt, inks, non-hazardous chemicals, biohazards without aerosol exposure | General use; chemical, biological, radiation, physical and animal hazards |
| | <p style="text-align: center;">Barrier</p>  | Does not permit blood or other potentially infectious materials to pass through due to 3-layer construction | Working with human blood, body fluids, tissues, cells or other potentially infectious material which may contain human bloodborne pathogens |
| Flame resistant coveralls |  | Flame resistant (e.g. Nomex or flame resistant cotton) including flame resistant cotton undergarments | Working with water or air reactive chemicals, flammable solvents, potentially explosive chemicals, welding, or electrical systems |

| PPE | Specific | Characteristics | Applications |
|--|---|--|--|
| Leather apron, jacket, coveralls and sleeves |  | Leather clothing | Welding or other shop work with potential sparks or projectiles |
| Aprons | Flame resistant (FR) apron  | Flame resistant (e.g. Nomex or flame-resistant cotton) | Working with flammable solvents, welding or electrical systems |
| | Rubber-coated wash apron  | Chemical splash protection, good abrasion resistance | Working with apparatus under pressure, splash potential of hazardous liquids |

Respiratory Protection

In a laboratory, airborne contaminants are kept very low through adequate general room ventilation and by working with open containers of volatile materials inside a chemical fume hood or enclosure designed to effectively capture air contaminants at the source. When airborne contaminants cannot be adequately controlled by engineered exhaust ventilation respiratory protection may be needed. The use of respiratory protection has very stringent regulatory requirements. Users must participate in the [MC Respiratory Protection Program](#), which includes medical clearance, annual training and fit testing. Contact Environmental safety for more information.

| PPE | Specific | Characteristics | Applications |
|-----------------------------|--|--|---|
| Dust mask |  | May protect against dusts, fumes, mists, microorganisms including animal allergens | Dusty environments, working with live animals or potentially infectious materials |
| N95 respirator |  | Protects against dusts, fumes, mists, microorganisms including animal allergens | Dusty environments, working with live animals or potentially infectious materials |
| Cartridge respirator | Half face air-purifying  | Protects against variety of particulates, vapors, dust, mists, fumes, or a combination of these; depends on filter or cartridge used | Dusty environments, potentially infectious materials, chemical vapors, particulates, and select gases (cartridge dependent) |
| | Full face air-purifying  | Similar to half-face, but with greater protection factor, and greater protection of eyes and face; depends on filter or cartridge used | Dusty environments, potentially infectious materials, chemical vapors, particulates, and select gases (cartridge dependent) |

Head Protection

Head protection may be as simple as a disposable bouffant surgical cap to protect the head from aerosols during surgical operations, or a hard hat to protect from overhead hazards. Electrical work may require arc flash protection of the head, face, hands and body; please consult your supervisor or ES safety staff for guidance.

| PPE | Specific Type | Characteristics | Applications |
|---|---|---|--|
| <p>Bouffant cap</p> |  | <p>Economical protection for hygienic work environments; protection from dirt, dust</p> | <p>Working with biohazards, surgical applications, animal facilities</p> |
| <p>Flame Resistant balaclava</p> |  | <p>Specialized electrical safety equipment</p> | <p>Electrical safety applications with higher hazard/risk or unknown</p> |
| <p>Bump cap</p> |  | <p>Light-weight plastic cap used to protect against scraping or bumping one's head</p> | <p>Designed for use in areas with low head clearance. Recommended for areas where protection is needed from head bumps and lacerations. These are not designed to protect against falling or flying objects and are not ANSI approved.</p> |

| PPE | Specific Type | Characteristics | Applications |
|------------------------|---|---|---|
| <p>Hard hat</p> |  | <p>Light-weight, metal or reinforced plastic to protect against overhead hazards incorporates a suspension to dissipate impact from falling objects</p> <p>Hard hats have an expiration date and should be replaced before they expire.</p> | <p>Hard hats are divided into three industrial classes: Class A hard hats provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts). Class B hard hats provide the highest level of protection against electrical hazards, with high- voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration hazards by flying/falling objects. Class C hard hats provide lightweight comfort and impact protection but offer no protection from electrical hazards.</p> |

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Foot and Leg Protection

Foot protection may be simple disposable shoe covers to minimize spread of contamination. In food service and vivariums, slip resistant shoes may reduce the risk of slips, trips and falls. In shops and industrial activities, the supervisor must evaluate the hazards and select foot protection accordingly.

| PPE | Specific Type | Characteristics | Applications |
|------------------------------------|---|---|--|
| Shoe cover |  | Protection from dirt, dust; maintenance of hygienic work environments, non-slip soles | Working with biohazards, animal facilities, or potential floor contaminants |
| Foot/shin guards, knee pads |  | Typically strap on to legs or feet If hazard is severe, use safety shoes with metatarsal guards. | Use of high-pressure washers, protection of shins and feet when handling heavy materials. Protection of knees when kneeling. |
| Slip Resistant shoes |  | Shoe with sole designed to enhance traction in slippery work environments | Working in animal facilities, custodial applications, food service facilities, medical/clinical settings, and shops |
| Safety shoes |  | Toe, metatarsal, foot protection, steel reinforcements and inserts. There are numerous types of safety shoes for specific applications. See Appendix B for information on obtaining safety shoes. | Handling heavy items, construction, warehouse applications, agricultural field work |

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Hearing Protection

In general, if workplace noise is loud enough that you cannot hold a conversation with a person one arm length away, then a noise assessment must be performed by ES prior to PPE selection. Some exposures may require enrollment in the MC [Hearing Conservation Program](#), which includes annual hearing tests and training. All hearing protection comes with a “Noise Reduction Rating” or NRR; the higher the rating, the better the protection.

| PPE | Specific Type | Characteristics | Applications |
|------------|---|--|---|
| Ear plugs |  | Disposable, inexpensive | Working with loud equipment, noises, sounds, alarms, etc. |
| Canal caps |  | Inexpensive, easy to insert, not as effective as ear plugs, but easier to insert with soiled hands | Working with loud equipment, noises, sounds, alarms, etc. |
| Ear muffs |  | Reusable, not as effective when worn with safety glasses | Working with loud equipment, noises, sounds, alarms, etc. |

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Fall Protection

A fall protection system is needed where there is a potential for injury due to falling while working at elevated height. Consult with ES prior to procurement of any items for a fall protection system. Fall protection regulations are contained in both General Industry Standards and Construction Standards. Proper training and inspection of equipment is required under these regulations. Consult ES for additional information.

| PPE | Specific Type | Characteristics | Applications |
|--|---|---|--|
| Full body harness |  | Provides protection from injury while falling from heights | Working at heights (greater than 6 feet) and confined space retrieval |
| Locking carabiner |  | Connect components of a fall protection system | Working at heights (greater than 6 feet) and confined space retrieval |
| Shock Absorbing lanyard |  | Provides connection from harness to anchor point with ability to lessen fall force factor, working length of 6 feet | Working at heights (greater than 18.5 feet of fall clearance) for fall arrest situations |
| Self-retracting lifeline w/swivel |  | Provides connection from harness to anchor, shorter activation distance reduces fall force factor | Working at heights for fall arrest situations where greater worker mobility is needed |
| Anchor |  | Primary point of attachment for a fall protection system, minimum 5,000 pound breaking strength | Working at heights (greater than 6 feet) and confined space retrieval |

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Arc Flash Protective Clothing and PPE for Electrical Workers

| Hazard/ risk catego | Minimum arc rating (cal/cm ²) | Arc-rated clothing | Fire-rated protective equipment | |
|---------------------------|---|---|---|---|
| 0 | NA | <p>Arc-rated not required <u>Untreated natural fiber</u> <u>or non-melting clothing</u></p> <ul style="list-style-type: none"> Long sleeve shirt and long pants | <ul style="list-style-type: none"> Safety glasses or safety goggles Hearing protection Heavy duty |  |
| 1 | 4 | <ul style="list-style-type: none"> Long sleeve shirt and long pants or coverall Face shield or arc flash suit hood Jacket, parka, rainwear or hard hat liner as needed | <ul style="list-style-type: none"> Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear as needed |  |
| 2 | 8 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear |  |
| 3 | 25 | <ul style="list-style-type: none"> Long sleeve shirt Long Pants Coverall Arc flash suit jacket, pants and hood Gloves Jacket, parka, rainwear as needed Hard hat liner | <ul style="list-style-type: none"> Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear |  |
| 4 | 40 | <ul style="list-style-type: none"> Long sleeve shirt Long pants, coverall Arc flash suit jacket, pants and hood Gloves Jacket, parka, rainwear as needed Hard hat liner | <ul style="list-style-type: none"> Hard hat Safety glasses or safety goggles Hearing protection Heavy duty leather gloves Leather footwear |  |

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SAFE USE AND REMOVAL OF PPE

PPE should fit properly, snug but not tight or 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. For loose fitting gloves, tape or fold a cuff on the gloves to prevent chemicals from running down the users arm.

Do not wear PPE outside of laboratory or shop areas to prevent spreading contamination to other areas.

Employees must be trained in how to put on PPE and the limitations of the PPE for the specific procedure. Workers need to handle PPE safely when removing it from the body to avoid contaminating themselves and surfaces nearby. Disposable gloves, sleeves, shoe covers and Tyvek clothing and potentially contaminated PPE such as aprons, lab coats and other items need to be removed so that any contamination is not exposed. Disposable items should be peeled off 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 inside.

INSPECTION, MAINTENANCE AND STORAGE

The PPE must be inspected for defects every time it is put on. Look for symmetry; does each side look like a mirror image of the other or is one side distorted? Are there any broken, bent, frayed or torn pieces? Are the lenses scratched so they are hard to see through? Is the elastic still springy or is it stretched out?

In addition to visual inspection as above, insulating gloves, sleeves and blankets for electrical workers must be electrically tested. All must be tested prior to initial use, and then every 6 months thereafter for gloves, and every 12 months for sleeves and blankets.

PPE should be clean. If dirty, clean it with soap and warm water. Do not use solvents or abrasives to clean it.

Store it out of sunlight in an area where it will be protected and kept clean.

Replace reusable PPE every 2-5 years, earlier if recommended by the manufacturer or if there is a major impact. Replace any defective parts with parts made by the same manufacturer for that equipment. Do not make makeshift repairs. If it cannot be repaired properly, replace it. Do not use paint or glue on PPE. Use decals or stickers to mark it.

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SOURCES FOR PPE

PPE may need to be ordered through local safety supply retailers.

New respirator users need to wait until they have completed respirator medical clearance, training and fit testing before ordering a respirator.

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RESOURCES

Montgomery College

- Hazard Communication Program <https://www.montgomerycollege.edu/offices/facilities/occupational-and-environmental-safety/hazard-communication.html>
- Personal Protective Equipment <https://www.montgomerycollege.edu/offices/facilities/occupational-and-environmental-safety/personal-protective-equipment.html>
- Respiratory Protection Program <https://www.montgomerycollege.edu/offices/facilities/occupational-and-environmental-safety/respiratory-protection-program.html>

Regulations

- OSHA Personal Protective Equipment Overview <https://www.osha.gov/personal-protective-equipment>
- OSHA Standard CFR 1910.132 General Requirements <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.132>
- CDC-NIOSH Personal Protective Equipment <https://www.cdc.gov/niosh/ppe/default.html>

Appendix A: Welding Operation Shading Guide*

| Welding | Shade |
|---|--------------|
| 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- |
| 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 |

* As a rule of thumb, 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, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

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Appendix B: Safety Shoes and Prescription Safety Glasses

Safety Shoes

Safety shoes may be required or recommended in various jobs at the College to help prevent foot injuries. 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

Safety glasses are required in many jobs at the College to help prevent eye injuries. Personnel who wear corrective lenses need to wear “over-prescription” safety glasses that fit over the glasses or wear prescription safety glasses. Departments are not required by regulations to provide prescription safety glasses, with the exception of 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.

Prescription Respirator Inserts for Full Face Respirators

Prescription respirator inserts (spectacle kits) for full face respirators can be obtained from various vendors. The inserts must be compatible with the respirator, and fitted with prescription lenses by an eye care professional.

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