

The Basics of Personal Protective Equipment (PPE)



PPE Training-Initial

PPE

101

- ❑ Personal Protective Equipment (PPE) is any safety equipment workers wear to prevent injury in the workplace when engineering and administrative controls fail to eliminate the hazard.
- ❑ Training is required by OSHA regulations contained in 29CFR 1910.132-140.
- ❑ After going through training you will know:



- When PPE is necessary
- What PPE is necessary
- How to properly don, doff, adjust and wear PPE
- The limitations of PPE
- The proper care, maintenance, useful life, and disposal of the PPE

Common Types of PPE

- Head
- Eyes
- Face
- Hands
- Feet
- Body
- Hearing
- Respiratory



Head PPE

- ❑ Needed when employees are exposed to hazards that have potential to cause a head injury.
- ❑ Examples of hazards:
 - Flying objects.
 - Falling objects or materials.
 - Working near exposed energized electrical equipment.
 - Working around or on scaffolds.
 - Working at construction sites.
 - Working around overhead tools or machinery.

Types of Head Protection

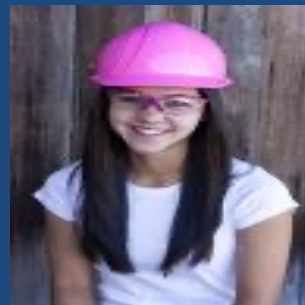
❑ Impact Protection

- Type I – Is designed to protect only against objects falling from straight overhead, hitting the hardhat on the top.
- Type II – Is designed to protect against blows on the top of the head as well as side impacts.



❑ Electrical

- Class A (old American National Standards Institute standard) or Class G (new ANSI Standard) good up to 2,200 volts.
- Class B (old ANSI standard) or Class E (new ANSI Standard) good up to 20,000 volts.
- Class C not rated for electrical protection.



Donning Head Protection

- ❑ Hard hat protection is effective only if the hat is adjusted to fit properly and is worn squared and not cocked at an angle or perched on the back of the head.
- ❑ Severe lacerations from relatively light blows have been incurred by workers wearing hard hats in unusual positions.
- ❑ Must not be worn backwards.

Care and Maintenance

- ❑ Check prior to each use for cracks, damaged suspension and chalky appearance (UV damage).
 - Be aware that stickers placed on hardhat can conceal damage.
- ❑ Replace as necessary.
- ❑ Do not store in direct sunlight.

Eye PPE

- ❑ Needed when an employee work presents the potential of causing eye injury from physical, chemical, or radiation agents.
- ❑ Examples of hazards:
 - Machines
 - Lasers
 - Impacts
 - Heat
 - Tools
 - Flying Particles / Dust
 - Electrical work
 - Chemical handling

Types of Eye Protection

❑ Non-Prescription safety glasses.



❑ Prescription safety glasses.

- Employees that wear prescription (Rx) lenses can use non-prescription eye protection worn over prescription lenses as long as it does not compromise the fit of either piece of eyewear.



❑ All eye protection must be ANSI Z87 approved.

Types of Eye Protection

- ❑ Goggles
 - Chemical
 - Laser
 - Welding



- ❑ Chemical goggles protect your eyes, eye sockets, and the facial area immediately surrounding the eyes from impact, dust, and splashes.
- ❑ Chemical goggles are generally stronger than safety glasses and are used for higher impact, particle and chemical splash protection.
- ❑ Laser and Welding goggles protect the eyes from harmful light.
- ❑ All eye protection must be ANSI Z87 approved.

Care and Maintenance

- Check prior to each use for cracks or damage.
- Replace as necessary.
- Store in a clean area.

Face PPE

❑ Needed when work presents the potential of causing facial injury from physical, chemical, or radiation agents.



❑ Examples of hazards:

- Contents under pressure
- Splash hazard
- Flying objects / particles
- Electrical work



Types of Face Protection

- Face Shield
- Welding Shield



Donning Face PPE

- ❑ Safety goggles or goggles must always be worn under a face shield.
- ❑ Once goggles are in place, position face shield over face and secure on brow with headband.
- ❑ Adjust to fit comfortably.



Hand PPE

- ❑ Needed when work presents the potential of causing hand injury from physical, chemical, or radiation agents.

- ❑ Examples of hazards:
 - Absorbing harmful substances
 - Sharp objects capable of causing cuts, abrasions, or punctures
 - Chemical or thermal burns
 - Electrical work
 - High/Low temperatures



Types of Hand Protection

- Chemical Resistant - (check MSDS) or compatibility charts such as the one found on EHS webpage:



PSU EHS - Mozilla Firefox
http://www.ehs.psu.edu/occhealth/gloves.cfm

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Glove Selection Chart

The times listed below are average breakthrough times for each type of glove, i.e. the minimum time that it will take for a given chemical compound to break through the glove material.

Chemical Name	Nitrile	PVC	Neoprene	Butyl	Comments
Acetic Acid, Glacial	4.5 hr	3 hr	7 hr	NR	
Acetone	NR	NR	10 min	> 17 hr	
Acetonitrile	30 min	NR	30 min	> 8 hr	
Ammonium Hydroxide, conc.	> 8 hr	4 hr	> 6 hr	NR	
Aniline	72 min	3 hr	35 min	> 8 hr	
Benzene	9 min	13 min	16 min	31 min	
Carbon Disulfide	20 min	NR	NR	< 4min	
Carbon Tetrachloride	2.5 hr	25 min	31 min	NR	
Chloroform	NR	10 min	12 min	NR	
Chromic Acid, 50%	4 hr	NR	NR	NR	
Dichloroethane	16 min	NR	33 min	2 hr	
Dimethyl Formamide	35 min	NR	10 min	> 8 hr	
Ethanol	> 8 hr	1 hr	1.5 hr	NR	
Ethyl Ether	64 min	14 min	10 min	8 min	

- Puncture / cut / abrasion Resistant
- Those with a latex allergy can use vinyl, nitrile, etc. based on the compatibility charts or MSDSs.



Types of Hand Protection

- Voltage Rated
- Temperature Resistant
- Infectious Agent / Biohazard Resistant –
Latex, Vinyl, Nitrile, etc)

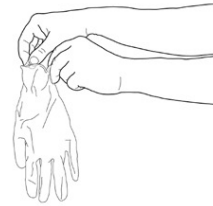


Glove Donning and Doffing

I. HOW TO DON GLOVES:



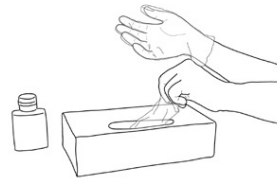
1. Take out a glove from its original box



2. Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff)



3. Don the first glove



4. Take the second glove with the bare hand and touch only a restricted surface of glove corresponding to the wrist



5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand

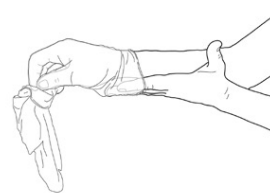


6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use

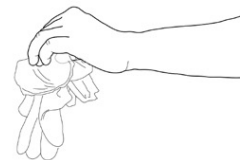
II. HOW TO REMOVE GLOVES:



1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out



2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove



3. Discard the removed gloves

Image: World Health Organization

Care and Maintenance

- Check prior to each use for cuts, cracks or discoloration.
- Replace as necessary.
- Discard single use gloves after use. (Latex, Nitrile, Vinyl, etc)
- Store in a clean area.

Feet PPE

- ❑ Needed when work presents hazards that have potential to cause a foot injury:
- ❑ Examples of hazards:
 - Falling objects
 - Rolling objects
 - Piercing/cutting injuries
 - Electrical work
 - Chemical exposure

Types of Foot Protection

- ❑ Steel toed
- ❑ Electrical resistant – (will have the letters “EH” on the tongue)
- ❑ Chemical resistant
- ❑ Must be ANSI Z41 or ASTM F2413-05 approved.



Care and Maintenance

- ❑ Check safety shoes prior to each use for cuts, cracks or other damage. Replace as necessary.
- ❑ Keep electrical hazard shoes dry and free from conductive materials. Replace if sole is punctured, cut, or embedded with conductive materials.
- ❑ Chemical resistant shoes should be replaced if they are discolored, disfigured, or exhibit any breaks, cracks, or other surface degradations.
- ❑ Store all shoes in a clean, dry location.

Body PPE

- ❑ Needed when work presents a potential for contamination or injury to other parts of the body such as legs, arms, back, chest.
- ❑ Examples of hazards:
 - Heat
 - Splashes
 - Hot/cold metals and liquids
 - Impacts
 - Sharp objects
 - Chemicals
 - Electrical work
 - Radiation



Types of Body Protection

- Lab coats
- Aprons
- Chemical resistant sleeves
- Tyvek suits
- Coveralls
- Arc Flash Rated



Body PPE Removal



Aprons and tyvek suits

Aprons and tyvek suits are used to protect your skin and clothing from contamination.

How to properly don a tyvek suit:

- Unfasten ties / unzip zipper
- Scrunch up the legs of the suit, making a space for your feet to go through to touch the ground
- Step into the suit one leg at a time
- Gently pull the suit over your legs and to your waist
- One arm at a time, put on the upper portion of the suit
- Zip the zipper



How to properly doff a tyvek suit:

- Unfasten ties / unzip zipper
- Peel gown away from neck and shoulder
- Turn contaminated outside toward the inside
- Fold or roll into a bundle
- Discard

Hearing PPE

- ❑ Needed when the average (over an 8 hour period) noise level of an area reaches 90 decibels.
 - Hearing protection must be made available to employees when the average (over an 8 hour period) noise level reaches 85 decibels.
- ❑ Examples of high noise areas can be:
 - Mechanical rooms
 - Shops
 - Construction Sites
 - When working with machinery/power tools
- ❑ See PSU Hearing Conservation Program for requirements:
 - http://www.ehs.psu.edu/occhealth/Hearing_Conservation_Program.pdf
 - More training is required to satisfy the training requirements for hearing protection. See EHS.

Types of Hearing Protection

- Ear Plugs
- Ear Muffs
- Canal Caps



Donning Hearing Plugs



- ❑ Follow manufacturers recommendations. The steps below is a commonly used method.

- ❑ **1. Roll** the earplug up into a small, thin "snake" with your fingers. You can use one or both hands.



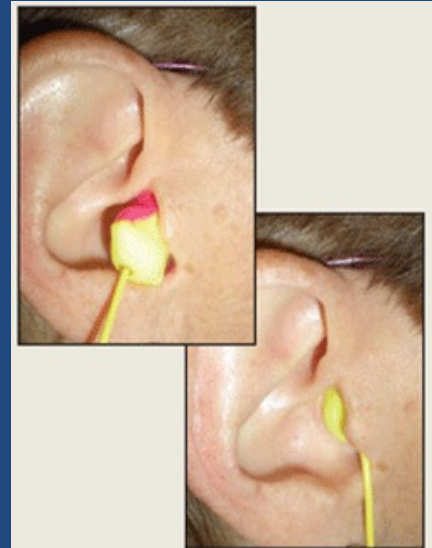
- ❑ **2. Pull** the top of your ear up and back with your opposite hand to straighten out your ear canal. The rolled-up earplug should slide right in.



- ❑ **3. Hold** the earplug in with your finger. Count to 20 or 30 out loud while waiting for the plug to expand and fill the ear canal. Your voice will sound muffled when the plug has made a good seal.

Ear Plug Fit Check

- ❑ **Check the fit** when you're all done. Most of the foam body of the earplug should be within the ear canal. Try cupping your hands tightly over your ears. If sounds are much more muffled with your hands in place, the earplug may not be sealing properly. Take the earplug out and try again.



Comparison of an improper fit of a foam earplug and a proper fit. Although the earplug is in place in both ears, the earplug shown on the left can have significantly lower attenuation (30-40 decibels across most frequencies) when compared to the earplug with a good fit.

- ehstoday.com/images/PPE-fit.gif

Care and Maintenance

- ❑ Check hearing protection for damage prior to each use for cuts, cracks or other damage. Replace if damage is found.
- ❑ Store all hearing protection in a clean, dry location.
- ❑ Replace disposable ear plugs frequently.

Respiratory PPE

- ❑ Needed when work presents an inhalation hazard.
- ❑ Examples of hazards:
 - Working with uncontained chemicals.
 - Working with highly toxic chemicals.
 - Working in dusty environment.
 - Painting.
 - Welding.
- ❑ See PSU Respiratory Protection Program for requirements:
 - http://www.ehs.psu.edu/occhealth/Respiratory_Protection_Program_Manual.pdf
 - More training is required to satisfy the training requirements for hearing protection. See EHS.

Types of Respiratory Protection

Dust Mask



1/2 mask



Full Mask

Powered Air Purifying respirator (PAPR)

Supplied Airline Respirator

Self Contained Breathing Apparatus (SCBA)



PPE Cleaning and Care

- ❑ PPE must be kept clean and sanitary. Clean PPE with mild soap and water . Some PPE may require special cleaning, in these cases use the manufacturer's recommendations.
- ❑ If PPE is contaminated and cannot be decontaminated safely, it may need disposed of in a special manner to protect other employees from exposure to the hazard. EHS shall be contacted.
- ❑ PPE shall be stored in such a way that it will not become contaminated such as plastic bags, lockers, closet, drawers.



PPE Maintenance and Repair

- ❑ Do not use PPE if it is damaged and in need of repair.
- ❑ It is the responsibility of the employee to make their supervisor aware as soon as PPE becomes damaged so that new PPE can be obtained.
- ❑ Do not attempt to repair PPE.

