



**THE OHIO STATE UNIVERSITY**

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# Personal Protective Equipment (PPE)

Environmental Health & Safety



# Objectives

- Know when PPE is necessary
- Know what PPE is necessary
- Know how to properly don, doff, adjust, and wear PPE
- Know the limitations of PPE
- Know the useful lifespan of PPE
- Know how to properly care, maintain, and dispose of PPE

This training covers the general objectives listed above.

Supervisors are responsible for additional in-person training as needed to ensure that their employees understand the PPE requirements specific to their position.



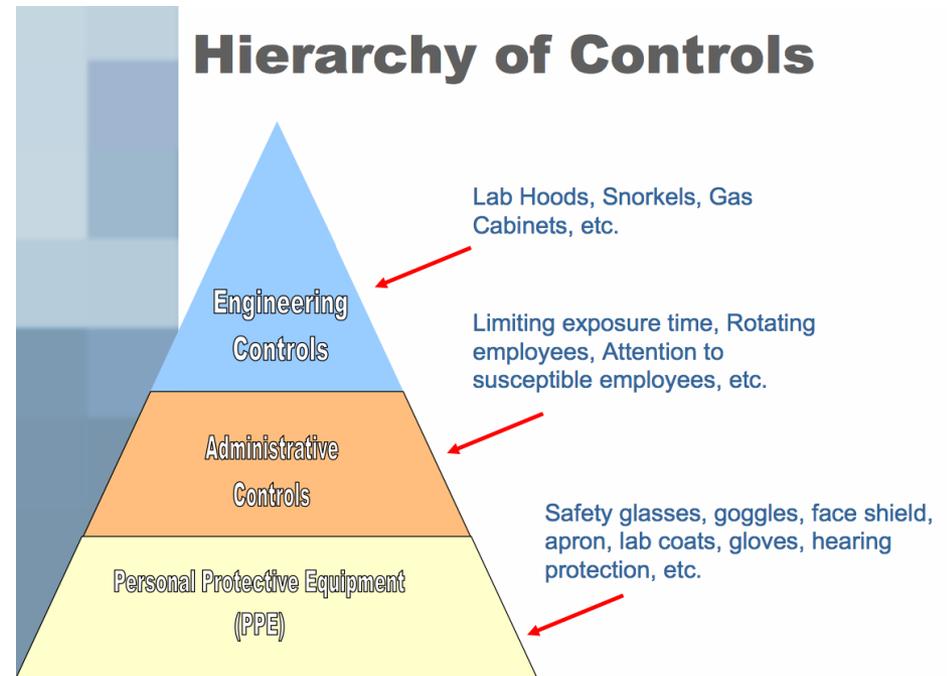
# What is PPE?

- PPE is a type of control method that reduces employee exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels
  - i.e. goggles, aprons, gloves, respirators, ear plugs
- If PPE is used, a PPE program should be implemented that explains:
  - The hazards present
  - The selection, maintenance, and use of PPE
  - The training of employees
  - Monitoring of the PPE program



# Hierarchy of Controls

- PPE should be the last line of defense against hazards in the work place
  - Behind engineering controls and administrative controls.
- Engineering Controls
  - Eliminate or reduce exposure to a hazard through the use of substitution of engineered machinery or equipment
- Administrative Controls
  - Changes in work procedures with the goal of reducing duration, frequency, and severity of the hazard





## When is PPE Necessary?

- Your employer is responsible for conducting a “hazard assessment” of the workplace and all tasks involved to identify all hazards that exist in the workplace
- Your employer will then determine what PPE is necessary for either entry into the facility or for a designed task within the facility to ensure employee safety



# Employer Responsibilities

- Perform a hazard assessment
- Train employees on the proper use of PPE
- Retrain when and if necessary
- Document and recordkeeping of all training sessions



# Employee Responsibilities

- Wear the designated PPE
- Always inspect PPE for damage before each use
- Inform your supervisor when PPE is defective, damaged, or doesn't fit
- Store and care for PPE properly

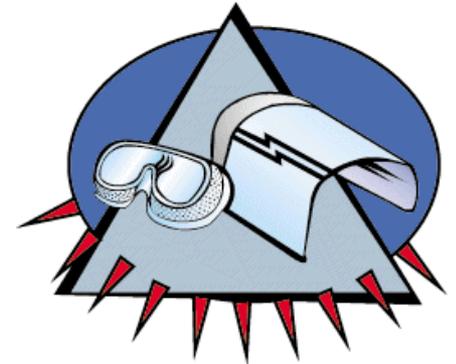


# Selecting Your PPE

- When choosing your PPE, you should keep the following in mind:
  - Make sure the PPE fits correctly
    - Not too big or too small
  - Make sure the PPE is comfortable to wear
- You may not use your own custom PPE unless it has been approved by the American National Standards Institute (ANSI) and your supervisor



# Eye and face protection





# Eye and Face Protection Hazards

- Eye and face protection items are intended to protect the employee from a number of hazards determined from the hazard assessment. These hazards include:
  - **Impact** – flying objects such as large chips, fragments, particles, sand, and dirt
  - **Heat** - anything emitting extreme heat
  - **Chemicals** – splash, fumes, vapors, and irritating mists
  - **Dust** – harmful dust
  - **Optical Radiation** – radiant energy, glare, and intense light



# Safety Spectacles

- Safety spectacles are intended to shield the wearer's eyes from impact hazards
- You are required to use safety spectacles with side shields when there is a hazard from flying objects.
- Non-side shield safety spectacles are not acceptable eye protection for impact hazards





# Safety Spectacles Lenses and Frames

## Lenses

- **Plano Lenses**
  - Should be used by workers who do not require vision correction
  - May be flat or curved
  - Are available in clear, filtered, or tinted lenses
  - May include removable lenses
- **Prescription Lenses**
  - Should be used by workers who require vision correction
  - May be clear, filtered, or tinted
  - May include removable lenses

## Frames

- **Spatula temples**
  - Fit *over* the ear
  - Can be either fixed or adjustable
  - Are available in plastic or metal
- **Cable temples**
  - Fit *around* the ear
  - Can be either fixed or adjustable
  - Are available in plastic or metal
- **Headband temples**
  - Are easily adjustable for a secure fit
  - Are useful for tasks requiring movement



# Safety Spectacle Side Shields

- Side shields provide angular protection from impact hazards in addition to frontal protection
- Flatfold or semi side shields:
  - May be part of or attached to the temple
  - Are permanent or removable
  - Are solid or ventilated
  - Are tinted or clear
- Full (cup) side shields may be:
  - Removable
  - Wire screen
  - Tinted or clear



# Safety Goggles

- Safety goggles are intended to shield the wearer's eyes from impact hazards
- They fit the face immediately surrounding the eyes and form a protective seal around the eyes
- Are available in clear lenses
  - Are available with removable lenses
  - May incorporate prescription lenses
  - Do not provide special protection against optical radiation





# Safety Goggles Frames and Ventilation

## Frames

- **Eyecup goggles**
  - Cover the eye sockets completely
  - Are available with direct or indirect ventilation
  - May be rigid or flexible
- **Cover goggles**
  - May be worn over corrective spectacles without disturbing the adjustment of the spectacles
  - Are available in direct, indirect, and non-ventilated types
  - May be rigid or flexible

## Ventilation

- **Direct ventilation**
  - Resist direct passage of large particles into the goggle
  - Prevent fogging by allowing air circulation
- **Indirect ventilation**
  - Prevent fogging by allowing air circulation
  - Protect against liquid or chemical splash entry
- **Non-ventilated**
  - Do not allow the passage of air into the goggle
  - Prevent splash entry
  - May fog and require frequent lens cleaning



## Face Shields

- Face shields are intended to protect the entire face or portions of it from impact hazards
- Must use in combination with safety goggles or spectacles
- When worn alone, face shields **DO NOT** protect employees from impact hazards (flying objects)





# Face Shield Windows

- Face shield windows extend from the brow to below the chin and across the entire width of the face
- They are available in both removable and lift-front designs
- Removable windows allow the replacement of damaged windows
- **Plastic windows**
  - Protect against light impact
  - May include a glass insert
  - Are available clear or filtered
- **Wire-screen windows**
  - May include a plastic/glass insert
  - Protect against moderate impact
  - Are not recommended for use involving chemical hazards



## Face Shield Headgear

- Headgear supports the window shield and secures the device to the head
- Adjustable headgear includes straps that allow the user to manipulate the size of the headgear to ensure a proper fit
- Hard hats with face shields may have a window shield mounted under the visor of the hat



# Limitations

- Safety spectacles are used mainly to protect the eyes from injury from flying objects
- Safety goggles are used to protect the eyes from impact and chemical hazards. Non-ventilated goggles may require frequent lens cleaning due to fogging
- Face shields are secondary protectors only and must be worn with safety spectacles or goggles



# How to Don and Doff Eye & Face Protection

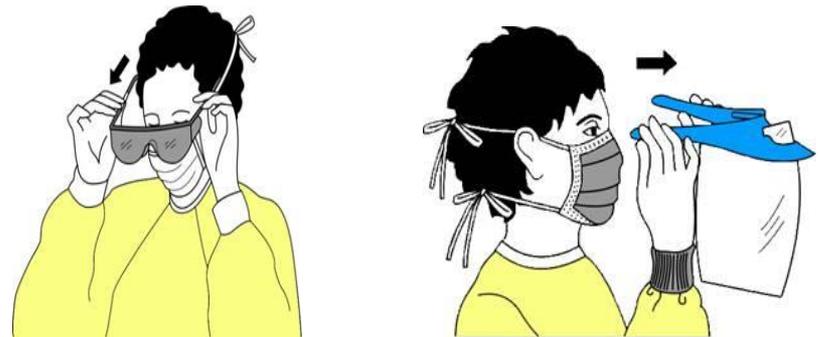
## Don (Put On)

- Position goggles over eyes and secure to head using the ear pieces or headband
- Position face shield over face and secure to brow with headband
- Adjust to fit comfortable



## Doff (Take off)

- Grasp ear or head pieces
- Lift away from face





# Hand protection





# Hand Protection

- Hand protection PPE is used to prevent potential injuries from hazards such as:
  - skin absorption of hazardous substances
  - chemical or thermal burns
  - electrical hazards
  - bruises, abrasions, and cuts
  - punctures, fractures, and amputations
- Some examples of hand protection items
  - Gloves
  - Finger guards
  - Arm coverings



# Selection of Protective Gloves

- There are many different type of protective gloves to choose from
- Different factors will determine which type of glove you will need to use
- Always use a type of glove specifically designed for the hazard
- Factors to keep in mind:
  - Types of chemicals handled
  - Nature of contact
  - Duration of contact
  - Grip requirements
  - Thermal protection
  - Abrasion/resistance requirements
  - Size and comfort



# Leather, Canvas, or Metal Mesh Gloves

- **Leather Gloves**
  - Protect against sparks, moderate heat, blows, chips, and rough objects
- **Aluminized Gloves**
  - Provide reflective and insulating protection against heat and require an insert made of synthetic materials to protect against heat & cold
- **Aramid Fiber Gloves**
  - Protect against heat & cold, are cut and abrasive-resistant and wear well
- **Synthetic Gloves**
  - Offer protection against heat & cold, are cut and abrasive resistant, and may withstand some diluted acids. These materials do not stand up against alkalis and solvents.



# Fabric & Coated Fabric Gloves

- Fabric Gloves
  - Protect against dirt, slivers, chafing, and abrasions. They do not provide sufficient protection for use with rough, sharp, or heavy materials.
- Coated Fabric Gloves
  - Normally made from cotton flannel with napping on one side. By coating the unnapped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities.



# Chemical and Liquid Resistant Gloves

- Chemical-resistant gloves can be made of a number of synthetic rubbers or various kinds of plastic
- Typically the thicker the material of the glove is, the greater the chemical resistance
  - However, a thicker glove may decrease grip and dexterity for the user
- You should always choose a type of glove that protects against the chemical you will be handling
  - Refer to a glove selection chart or a Safety Data Sheet (SDS) of the chemical you will be handling



# Types of Chemical-Resistant Gloves

- Butyl Gloves – are made of a synthetic rubber and protect against a wide variety of chemicals
  - **Work well with:** peroxides, corrosive acids, strong bases, alcohols, aldehydes, ketones, esters, and nitro compounds
  - **Work poorly with:** aliphatic or aromatic hydrocarbons and halogenated solvents



# Types of Chemical-Resistant Gloves

- Natural (latex) Rubber Gloves – one of the most popular gloves used thanks to their comfort, tensile strength, elasticity, and temperature resistance
  - **Work well with:** water solutions of acids, alkalis, salts, and ketones
- Some people may be allergic to the latex found in these gloves and may need to find hypoallergenic gloves



# Types of Chemical-Resistant Gloves

- Neoprene Gloves – made of a synthetic rubber that has a greater chemical and wear resistance than natural rubber
  - **Work well with:** hydraulic fluids, gasoline, alcohols, organic acids, and alkalis



# Types of Chemical-Resistant Gloves

- Nitrile Gloves – made of a copolymer that can stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate
  - **Work well with:** oils, greases, acids, caustics, and alcohols
  - **Work poorly with:** strong oxidizing agents, aromatic solvents, ketones, and acetates



# Types of Gloves



**Natural Rubber**



**Polyvinyl Alcohol (PVC)**



**Nitrile**



**Neoprene**



**Polyvinyl Chloride (PVC)**



**Cotton**



**Wire mesh**



**Kevlar**



**Welding**



**Leather**



**Anti-vibration**



# How to Don and Doff Hand Protection

## **Don (Put On)**

- Open glove at the cuff and extend opposite hand into glove
- Once the hand is properly aligned in the glove, move fingers down into the glove's fingers
- Roll the cuff of the glove down the wrist until the glove is secure

## **Doff (Take off)**

- Pull the glove from above the cuff upwards on the hand inside out to trap potential contaminants inside the used glove
- Place the used glove into the palm of the opposite hand (which remains gloved)
- Repeat on opposite hand



# How to Don and Doff Hand Protection

## I. HOW TO DON GLOVES:



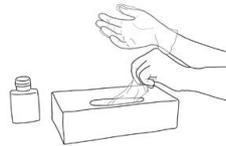
1. Take out a glove from its original box



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

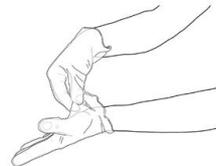


5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand

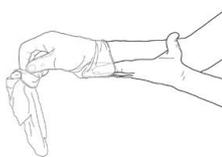


6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use

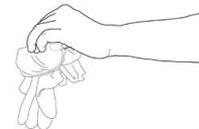
## II. HOW TO REMOVE GLOVES:



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



# Limitations

- Gloves should be visually inspected before each use
  - Look for punctures, cuts, discolor, and stiffness of the material
- Any gloves that have damage should be immediately discarded and replaced
- Reusing chemical-resistant gloves should be very carefully evaluated

# Safe and Healthy Buckeyes

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- **Follow all directional signage.**
- **Wear a face mask unless instructed otherwise.**
- **Maintain a safe physical distance of at least 6 feet apart.**
- **Remember to wash hands frequently with soap and water for 20 seconds.**

**TOGETHER AS BUCKEYES**